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Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

Indexes for the previous 6 months will be found in the First number of July and the First number of January.

Collections are invariably made directly from this office for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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[OFFICIAL NOTICE.]

Second Annual Meeting, Canadian Gas Association.

CANADIAN GAS ASSOCIATION,
OFFICE OF SECRETARY,
WOODSTOCK, ONT., May 26th, 1909.

To the Members of the Canadian Gas Association: The second annual meeting of the Canadian Gas Association will be held in Montreal, Canada, Friday and Saturday, June 18 and 19, 1909, and will be called to order at 10 o'clock, the morning of the 18th, by the President, Mr. J. C. Hay.

The headquarters of the Association will be at the Windsor Hotel, where all business meetings will be held, but there are numerous other first-class hotels in the city. Several other attractions are on during this meeting, and members are asked to secure rooms early. The rates at the Windsor Hotel are as follows:

Room with bath, one person.....	$3 per day.
Room with bath, two persons.....	4 "
Room without bath, one person.....	2 "
Room without bath, two persons. ...	3 "

The list of paper to be read is as follows:

"Experiences in Changing an Artificial Gas Plant to a Distributing One for Natural Gas," by Mr. P. S. Coate, Chatham, Ont.

"Gas Arc Installation and Maintenance," by Mr. Arthur Hewitt, Toronto, Ont.

"Candle Power of Gas in Canada," by Mr. J. Keillor, Hamilton, Ont.

"A Few Hints on the Gas Plant," by Mr. J. M. H. Young, London, Ont.

The Entertainment Committee have arranged the following programme:

After the adjournment of the business meeting on Friday, an observation car of the Montreal Street Railway Company will convey the members to Lachine (leaving the Windsor Hotel at 4 o'clock) and connect with boat to run the Lachine Rapids, arriving back in Montreal about 6:30 or 7 P.M. The same car will meet the boat and the party will be taken to Dominion Park for dinner, after which, the sights of the park can be taken in. The car will be kept in attendance to return the members to the hotel.

Saturday morning, after adjournment, a visit will be paid to the gas plant of the Montreal Light, Heat and Power Company, and on Saturday afternoon, those so desiring, will have the opportunity of attending the race meeting of the Montreal Jockey Club, which is in progress on these dates.

It is very important that the Committee be able to estimate the attendance and you are asked to please sign the inclosed card and return it to the Secretary by mail. A. W. MOORE, Sec'y-Treas.

[NOTICE.]

Wrinkle Department, American Gas Institute.

WRINKLE DEPARTMENT, AMERICAN GAS INSTITUTE,
OFFICE OF EDITOR, GAS OFFICE BUILDING,
DETROIT MICH, March 12th, 1909.

To the Members, American Gas Institute: All members of the American Gas Institute are earnestly requested to forward contributions for the Wrinkle Department as soon as possible.

Your co-operation determines the success of the Department.

F. L. Cross, Editor.

LIBRARY OF CONGRESS
JUN 14 1909
SMITHSONIAN DEPOSIT

BRIEFLY TOLD.

THE TARIFF AND GAS LIGHTING.—"There is a matter at present in the hands of the Finance Committee of the Senate concerning the duty on thorium nitrate which is of serious import to the gas fraternity. With one exception every gas mantle manufacturer in this country uses thorium nitrate, which is imported from Germany, and it is proposed to increase the duty from 25 to 45 per cent. ad valorem, and in addition there will be a special duty of 60 cents per pound. The thorium nitrate which is refined in this country represents a small portion of the quantity consumed, and this is taken by one concern. The effect of an increase in the duty on the imported product would be to compel all manufacturers, who could not obtain the material at the present price from the home concern, to increase the price of gas mantles. The future of gas lighting depends largely upon the universal use of mantles, and it would be interesting to know who will be benefited by an act which will tend to retard the magnificent growth which we have witnessed in the last decade. The output of electric incandescent lamps probably exceeds that of gas mantles by 25 per cent., which is sufficient evidence of the fact that our smaller manufacturers should be given every encouragement to increase their production, rather than that measures be pressed for their repression, with the U. S. Customs office as the wielder of the big stick. Indeed is the gas maker sore beset by his representatives in Congress, for who of them, in the present "tariff readjustment," lifted his voice or exercised his influence to keep England, Germany and France from dumping into the States great quantities of gas works tar? The wonder, really, in this latter instance, is that they have gone no further. How would it look if the Customs framers, in the latter respect, for instance, just took another stride—one which would put them in the position of offering a bounty for every gallon of gas works' tar brought to this country?—S.

A NOTABLE INSTALLATION AT A MEMORABLE TIME.—A correspondent, whose communication came to hand at a date too late for publication in our semi-centennial issue, in that the space therein had a week or more ago been taken up, sends the following interesting matter. The year 1909 celebrates the Fiftieth Anniversary of the P. H. & F. M. Roots Co., which firm name now world wide among gas men, 50 years ago, through an attempt to build a water motor, the first Roots' blower built of iron with wood impellers, came into existence. The blowers were successful from the start and, some years later, the first gas exhauster of the Roots' type was sent to the old New York Gas Company, and continued in service for many years. Contrast this machine of about 8 cubic feet displacement, working against a pressure of a few inches of water, with the 152 cubic feet machine recently installed at the 45th avenue and 12th street Station of the Peoples Gas Light & Coke Co., Chicago. This machine is the largest high pressure rotary gas pump in the world, delivering over one million cubic feet per hour, against a pressure of 6 pounds. It is driven by a Snow tandem, side-crank gas engine, of a maximum rating of 600 brake horse power. The exhauster is of the well-known Roots' high pressure type, with double outboard-bearings, removable bearing shells, quarter-boxes and ring-oiling features. The power from the engine is transmitted through a Roots' flexible coupling. The outfit runs at a speed of 130 revolutions per minute and, by means of an adjustable governor on the engine, may be made to operate as low as 65 revolutions per minute, thus furnishing a unit of great flexibility. The combined unit has shown excellent economy in operation. The high pressure Roots' pump has delivered gas at 5 pounds pressure, continuously, with an average volumetric efficiency of 90 per cent., and not over 8 per cent. mechanical friction, thus showing, approximately, 84 per cent. efficiency at the shaft, while the gas engine has continuously delivered a brake horse power with a consumption of less than 10,000 B.T.U.'s. The illustration that will accompany the advertising matter of the Roots Company's full page advertisement in your semi-centennial number will give a good idea of the combined unit, and marks a distinct advance in the transmission problem as affecting gas distribution for city service. These results have not been "jumped at," but have gradually developed during the 50 years of the Roots Company's existence, and it is with a feeling of keen satisfaction that its Fiftieth Anniversary sees the installation and successful operation of such a high-class and efficient pumping unit.—"J."

HYDRO-ELECTRIC PLANTS.—We are indebted to the courtesy of Mr. George D. Shepardson, "Head Man" in the College of Engineering, the University of Wisconsin, Minneapolis, for this account respecting the matter named in the titling: Mr. A. C. Pratt, Electrical Engineer for the Missouri River Power Company, Helena, Mont., recently gave an interesting lecture before our electrical engineering students on "Hydro-Electro Plants." His Company has in operation, or under construction, three dams in the Missouri river, having heights of 30, 60 and 110 feet, and making reservoirs of 4,000, 6,000 and 7,000 acres, respectively. The Missouri river has a minimum flow of about 3,000 cubic feet per second, and the reservoirs created by the three dams provide storage capacity of about 21 million horse power hours, which would maintain a steady load of 15,000-horse power for more than a month. This makes the Company safe in connecting with a load considerably larger than the minimum power of the river. An interesting phenomenon is that the heat from the sun received in the winter, and caught in the reservoirs, keeps the water under the ice about 2° above the freezing temperature. A practical point in transmission is to have the transformers for the receiving end of the line wound for a pressure about 15 per cent. lower than that at the power house, thus keeping nearly all of the transformer winding in service, giving minimum iron and copper losses, and most efficient operation. The most desirable kind of load in mining districts is given by motors for pumping and crushing. The hoists give a rapidly varying load similar to that of a street railway. Some hoists in the mine at Butte, Mont., run up to 3,000-horse power, lifting cars, weighing 6 to 12 tons, at a speed as high as 2,500 feet per minute. Steam power for the mines at Butte costs about $95 per horse power per year in large plants, and about $300 in small plants. With power at $30 per horse power per year, land can be irrigated profitably, even pumping water to a height of 150 feet. Thus, land costing $10 per acre can be made worth $100 per acre at a cost of $5 to $6 for pumping. The yearly evaporation in Montana is about 50 inches. The plant at Canyon Ferry has been in continuous operation since it was built in 1897, power being transmitted 20 miles to Helena and 65 miles to Butte. There are from 6 to 8 short circuits per year caused by lightning. The trouble from lightning always originates on the plains and never in the canyons. The trouble most always comes on the topmost wire. About 70 per cent. of the line troubles come from outside interference. The insulators on the line are supported by wooden pins boiled in paraffine at 115° to 120° C.

OUR SEMI-CENTENNIAL ISSUE.—In order that our readers may thoroughly understand the plan under which our semi-centennial will be issued next month, we say that it is to consist of at least 100 pages. Of the entire book's space one-half will be given to the publication of original articles, from the pens of men eminent in the gas industry, the subjects to be largely, in fact generally, reminiscent of the advances made in the industry since the time of the appearance of the first issue of this publication. The balance of the book will be given over to advertising, the rates for which have heretofore been publicly given. The advertising space has been taken, and those who, failing to appreciate the exceeding value of this special issue as an advertising medium, until they have the issue in front of them, may not regret their inaction on the basis of the excuse that the matter had not been put before them in a sufficiently clear manner. One copy of this issue will be mailed to our regular subcribers and advertisers, *without charge* of any kind to them, and those wishing extra copies will be charged therefor at the rate of 50 cents per number in every instance. It has not been our custom, nor has it been our necessity, to make claims respecting our position in the field of American gas industry; for our position therein was never in danger, in so far as leadership and influence for good on the destinies of the trade as a whole are concerned. In this instance, however, we have no hesitation whatever in positively and truthfully proclaiming that in solid value to the industry which concerned it and which it concerns, no other supplement of any trade paper has equaled it. A glance at the names of the contributors, and the titles of their contributions as well, will show the truth of our proclaim, and that list, so that it may be perfectly accurate, will be published in our issue for June 28th. Those intending to order extra copies of the Semi-Centennial issue should order them at once, since it is the intention of the proprietors to limit the edition to 8,000 copies.

CURRENT MENTION.—

THE June meeting of the New England Section of the Illuminating Engineering Society, which is to be held in Boston, to-morrow evening, is sure to be interesting. Mr. Norman Macbeth, Manager of the Welsbach Company's Laboratories, is down for a stereopticon-illustrated speech on "The Efficiency of the Small Mantle Burner," and Mr. Gibbs will have charge of the gathering which will eat in "Louis" restaurant, one way of approaching which is through Bumstead Place.

A Proposed International Unit of Light.

[Issued from the Department of Commerce and Labor, Bureau of Standards, Washington, D. C., under date of May 20, 1909, under the classification "Bureau Circular, No. 15; 2d Edition," superseding the first Edition, issued April 1, 1909.]

The following announcement, relative to the unit of light of America, France and Great Britain, is being made simultaneously in these three countries. The announcement is being made in Great Britain by Dr. R. T. Glazebrook, Director of the National Physical Laboratory, and in France by Prof. Paul Janet, Director of the Laboratoire Central d'Electricité.

In order to determine as accurately as possible the relations between the photometric units of America, France, Germany and Great Britain, comparisons have been made at different times during the past few years between the unit of light maintained at the Bureau of Standards, Washington; at the Laboratoire Central d'Electricité, Paris; at the Physikalisch-Technische Reichsanstalt, Berlin, and at the National Physical Laboratory, London.

The unit of light at the Bureau of Standards has been maintained through the medium of a series of incandescent electric lamps, the values of which were originally intended to be in agreement with the British unit, being made 100/88 times the Hefner unit.

The unit of light at the Laboratoire Central is the bougie décimale, which is the twentieth part of the standard defined by the International Conference on Units of 1884, and which is taken, in accordance with the experiments of Violle, as 0.104 of the Carcel lamp.

The unit of light at the Physikalische Techniche Reichsanstalt is that given by the Hefner lamp burning at normal barometric pressure (76 cm.) in an atmosphere containing 8.8 liters of water vapor per cubic meter.

The unit of light at the National Physical Laboratory is that given by the 10-candle power, Harcourt pentane lamp, burning at normal barometric pressure (76 cm.) in an atmosphere containing 8 liters of water vapor per cubic meter.

In addition to the comparisons of electric and flame standards, carried out recently by the national laboratories in Europe, one comparison was made in 1906, and two in 1908 between the American and European units by means of carefully seasoned carbon filament electric standards, and as a result of all the comparisons the following relationships are established between the above units.

The pentane unit has the same value within the errors of experiment as the bougie décimale. It is 1.6 per cent. less than the standard candle of the United States of America, and 11 per cent. greater than the Hefner unit.

In order to come into agreement with Great Britain and France, the Bureau of Standards of America proposed to reduce its standard candle by 1.6 per cent. provided that France and Great Britain would unite with America in maintaining the common value constant, and with the approval of other countries would call it the International candle. The National Physical Laboratory, London, and the Laboratoire Central d'Électricité, Paris, have agreed to adopt this proposal in respect to the photometric standardization which they undertake, and the date agreed upon for the adoption of the common unit and the change of unit in America was April 1, 1909.

The following simple relations will therefore, hold after that date:

1 International Candle = 1 Pentane Candle.
" " = 1 Bougie Décimale.
" " = 1 American Candle.
" " = 1 11 Hefner Units.
" " = 0.104 Carcel Unit.
Therefore 1 Hefner Unit = 0.90 International Candle.

The pentane and other photometric standards in use in America will hereafter be standardized by the Bureau of Standards in terms of the new unit. This, within the limits of experimental error, will bring the photometric units for both gas and electrical industries in America and Great Britain, and for the electrical industry in France to a single value, and the Hefner unit will be in the simple ratio of 9/10 to the International candle.

The proposal to call the common unit of light to be maintained jointly by the national standardizing laboratories of America, France and Great Britain, the "International candle," has been submitted to the International Electrotechnical Commission, which will endeavor to secure the indorsement of the proposal by all countries of the world which are represented on that Commission.

It is hoped that such general approval may be secured, and that in the near future the term "International Candle" will receive general sanction.

The above announcement marks an important step forward in the history of photometric measurements. For many years the British parliamentary candle was the unit recognized in this country, but the lack of precision in practical photometry did not permit its value to be very accurately expressed or reproduced. In recent years the gas industry has employed the 1-candle power sperm candle, the 10-candle power Harcourt pentane lamp, the Hefner lamp, and various secondary standards, while the electrical industry has employed incandescent electric lamps either certified by the Bureau of Standards or rated in terms of standards that are consistent with those of the Bureau. The unit of the Bureau has been maintained very constant, as shown by frequent comparisons with the standards of France, Germany and Great Britain, but differed appreciably from the British unit and hence from the unit employed by most of the gas companies in America.

The Bureau of Standards took the initiative several years ago in bringing about international uniformity in the unit of light by sending its representatives abroad with copies of its standards to determine more accurately the relative values of the units of the several European countries and to urge the adoption of an international unit. In this country the American Institute of Electrical Engineers, the American Gas Institute, and the Illuminating Engineering Society have acted together in support of the movement, and have voted in advance to recognize the new unit of candle power.

In England the National Physical Laboratory has secured the indorsement of the London Gas Referees and the Institution of Gas Engineers.

The union of the three national standardizing institutions of America, France and Great Britain in maintaining a common unit of candle power, and the co-operation of the German Reichsanstalt in redetermining, from time-to-time, the ratio of the Hefner unit to the common international candle, assures the highest attainable constancy for the new unit of light.

Unfortunately there is no primary photometric standard that is sufficiently constant and reproducible to be generally accepted as an international standard. France, Germany and Great Britain each has its own primary flame standard, and a great deal of effort has been expended in attempting to determine accurately the relations between them. Until the flame standards themselves are better understood, however, and the atmospheric and other conditions more perfectly controlled, the unit of light cannot be preserved as accurately by primary flame standards as by incandescent electric secondary standards. The latter, when well made, properly seasoned, and carefully measured, permit comparisons to be made (using the means of many settings on several lamps) with excellent precision, the lamps themselves being constant enough and the precision of measurement high enough to fix the final values to about one or two-tenths of 1 per cent. There is good reason to believe that in this way the international unit of light can be preserved so nearly constant that any inevitable drift occurring one way or the other would be too small to detect with certainty by any of our present flame standards in many years. The Bureau of Standards will continue to standardize flame standards by the electric standards and will also carefully investigate the more important flame standards. Similar tests and investigations will also be made in Europe, and if any appreciable drift does occur it will sooner or later be detected.

Careful distinction should be made in this connection between a *unit* and a *standard*. An international unit maintained by the co-operative effort of several national standardizing institutions, and checked from time-to-time by means of all the best primary standards in use, is more likely to be maintained constant than if it were defined to be represented by any single primary standard, unless such a primary standard were reproducible to a very high degree of precision. Such a *unit* can be continued permanent even though all present primary *standards* are ultimately superseded by better ones. The Hefner lamp as a convenient flame *standard* will not be displaced in America or any other country which adopts the international candle as its unit of light. Uniformity among different countries and continuity of value are prime necessities with respect to the *unit*. But the particular standard by which the unit is realized in practice is largely a matter of convenience and circumstance. In the photometry of electric lamps, electric standards are most suitable. In gas photometry one form of flame standard or another will be employed according to circumstances. It is not expected that all countries of the world will at once adopt the proposed international candle as their unit of light. Those countries which already have the Hefner unit in general use may prefer to continue it. But if all countries

which have a unit differing appreciably from the Hefner shall adopt the international candle as their unit, there will then be only two units in use throughout the world, and they will have the simple ratio 9:10. This would result in a distinct gain both in the practice of photometry and in definitions and nomenclature.

The effect of this change of 1.6 per cent. in the unit of the Bureau, which is in general use for electric lighting throughout the country, is to raise the candle power rating and decrease slightly the watts per-candle of electric lamps. A 16-candle power lamp will give 16.26 candles in the new unit, or a 16-candle power carbon filament lamp burning at 110 volts will give 16 candles on the new basis at 109.69 volts. The change, though small, is important in the photometry and rating of lamps.

The new unit of candle power being in agreement with the present English unit as represented by a 10-candle power standard pentane lamp, there will be no change in the unit of light now employed by those gas companies which use pentane lamps, provided they are in agreement with the English standard. But as pentane lamps may differ slightly from one another, even when burned under the same conditions, it is desirable for the sake of greater uniformity to have them standardized in terms of the standard candle of the Bureau. These variations, amounting to from 1 to 5 per cent., are generally in the same direction; that is, the lamps if not correct usually give less than 10 international candles under standard conditions when burning in a pure atmosphere at a normal barometric pressure of 76 cm. of mercury and an atmospheric humidity of 8 liters of water vapor per cubic meter. In anticipation of this change some of the largest gas companies in the United States have already had their pentane and Hefner standard lamps standardized by the Bureau in terms of the new unit.

Gas standards will hereafter be certified in terms of the international candle, electric standards will be certified in terms of the old unit until July 1, 1909, unless otherwise requested. On July 1 the new unit will be adopted by the Bureau of Standards in the certification of electric standards, and it is hoped that manufacturers of electric lamps will adopt the new unit as soon thereafter as possible.

The Bureau recommends that all gas and electric companies, all photometric laboratories, and all the manufacturers of electric lamps in the United States adopt the new unit of candle power, if possible, not later than January 1, 1910.

Further information with regard to change of photometric unit or to the testing of gas and electric standards will be given on request.

[Proceedings, as Furnished by the Secretary.—Continued from page 1023.]

PROCEEDINGS, THIRTY-NINTH ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Held in Young's Hotel, Boston, Mass., Feb. 17, 18, 1909.

Second Day—Morning Session.

The President—We seem to have finished about all of the programme except

A Few Questions.

The first of these is:

"Best method of maintenance for domestic lighting?"

Who has had any experience in caring for domestic lighting?

Mr. Miller—As our friend Mr. Peter Young, of Pittsburgh, has said at many gas meetings, he wanted somebody to tell him how to sell artificial gas in a natural gas town. In Pittsburgh the only way we can sell manufactured gas is to give maintenance and the best of service. Take the arc lamp, for instance. We install these lamps without charges and maintaim them free. Recently I started to put in the single inverted lamps, which we sell, but we maintain them free, and they have taken very well. The maintenance cost is low, but at present I cannot give any figures.

Mr. C. A. Learned—Would Mr. Miller state the difference in the selling price between natural gas and artificial gas in Pittsburgh?

Mr. Miller—Natural gas, 27½ cents per 1,000; artificial gas, $1, or 85 cents for 25,000 cubic feet per month and more.

The President—If there is nothing further we will pass to the next question, which is as to

"Best method of determining amount of benzole in gas?"

Who will answer that for us? Can Mr. Willien give us any information?

Mr. Willien—I am not aware that I can give any information. I know, however, that I have used the absolute alcohol method. Two of the other methods, I think, are the nickel nitrate and sulphuric acid.

The President—Mr. Ramsburg, can you give us any further light?

Mr. Ramsburg—The methods for determining the amount of benzole in gas are nearly all inexact, and more or less unreliable, which is chiefly due to the fact that no other substance is a solvent for this vapor alone. The operation is also complicated by the presence of the vapors of toluene and xylene. The method which involves the use of absolute alcohol, saturated with coal gas from which the illuminants have been removed, has not at the present time much standing, and was at all times an approximation and not a determination. I have used the method frequently, and for a long time considered it correct; but with the introduction of asphalt base oils in water gas manufacture, the method did not pan out. Another method which has fallen by the way-side, is that suggested by Professor Dennis, and an associate at Cornell University, consisting of an absorption of the benzole vapor by a nickel salt solution. It has, however, in our experience, proved a complete failure. For coal gas alone, under certain conditions, it may be a success; but it is certainly not a proper method for use in general analysis. There is, however, one method that I think is, for practical purposes, efficient and valuable. It is exploited by Mr. Hedric Anderson, of Philadelphia, and is so simple that one is astonised to think it unused before. This determination involves a comparison between the increase in volume of the gas in question and air when brought in contact with chemically pure benzole. The deduction being that the two, being read under the same conditions of temperature and pressure, and the amounts of benzene homologues present in the gas being small volumetrically, the difference in the two will represent to all intents and purposes the amount of benzene vapor present. I think this method will soon come into use, but as it is Mr. Anderson's purpose to publish his researches on the subject in the near future, I will not now go into the matter any deeper.

The President—That covers the question very well. The next question is:

"Best method of adding benzole to gas for enriching?"

I think the man who made it pay financially should be able to tell us how to do it.

Mr. Prichard—I don't know that I can tell you the best method of using it. The method that is satisfactory to us, or the method that we use, has been to use substantially an ordinary feed-water heater, which has a coil of steam pipe inside. The benzole is put in, not by gravity feed but by measurement feed, so that we insure a regular flow. The gas is discharged into the main, near the meter, at a temperature, if I remember right, of something over 200° F.

The President—Any other answer to this question. I think though that covers it satisfactorily. Another query:

"What apparatus is in use for determining oil dewpoint of gas?"

Mr. Klumpp—The dewpoint of a gas may be determined by a small instrument called the hygrometer, and the gas passes through this hygrometer, impinging upon the outside of a glass tube containing some easily volatile liquid, such as ether or pentane, and is gradually cooled until it deposits the vapor of water or oil product on the tube. The temperature at which this deposition starts to take place is shown by a thermometer, and designates the dewpoint of the gas, which means that it determines the lowest temperature to which the gas was subjected in passing through the main system. I don't think there is any other way of determining the dewpoint of gas, except to reduce its temperature until condensation occurs.

The President—Again,

"What is best method of feeding oil to carburettor?"

I think Captain McKay knows something about feeding oil to carburettors.

Capt. McKay—The method we were disposed to favor is temporarily displaced from service, and for that is being substituted another system with which I am not familiar. It is a cold oil feed. What I really want to find out is, why is it better to feed oil hot or cold? Of course, you can distribute it either way, but what I want to know is, why is it better one way than the other? There seems to be some reason for thinking it is better hot; if so, then why do others think it is better to have it cold?

The President—Mr. Ramsburg, do you care to reply?

Mr. Ramsburg—The question of oil feed is one which at the present time in Philadelphia is about to receive considerably more attention than it has received in the last decade. Personally I think there is hardly anything so important in the water gas apparatus as the method of feeding oil to the apparatus. Some 10 years ago we had in operation in Philadelphia oil heaters which were placed in the take-off pipes. These proposed to use some of the waste heat that went out in the gas, the only trouble being that they worked for about ¼ of a minute when the oil started to flow, after which the oil got cold, owing to the fact that the oil heaters were not big enough. When you consider that the total amount of heat abstracted from the water gas machine by the oil and replaced by generator fuel amounts to just .9 of 1 pound, and that is really less than 3 per cent. of the total generator fuel, the idea of preheating the oil for the sake of saving in heat is to be disregarded. For the purposes of distribution in the carburettor I am not sure whether hot oil will distribute better than cold oil or not. I should think certainly, everything else being equal, that hot oil would distribute at least slightly better. In Philadelphia we distribute our oil cold, with a design of spray which we have used for a great many years, but which has not been adopted very extensively outside. It consists of a rose-jet with shoulder, which is arranged with a seat, so that it can be pulled up out of the heat during the blast. Personally, I think the day will come when the oil will be admitted to the carburettor entirely as a vapor. Consider the idea of running oil in on a heat of 2,500°, 2,600° and 2,700°. While, of course, the oil itself does not reach any such heats as these, owing to evaporation, still some of it does, and knowing, as we do, that the function of the carburettor is purely a vaporizer, and that violent temperature shocks are fatal to delicate chemical reactions, such as the breaking down of hydrocarbons, I expect to see the time arrive when the carburettor will be run at a temperature not exceeding 1,500°. The oil being put in as a vapor, it will be held for a considerable time at a low heat. Under this condition I would expect the formation of much less tar and an increase in the candle power per gallon.

Mr. Barnum—Mr. Ramsburg, is it your practice to keep the carburettor at 2,600° or 2,700°?

Mr. Ramsburg—It is the practice to keep it just as hot as we can possibly get it, keeping the superheater top normal.

Mr. Barnum—How high can you stand?

Mr. Ramsburg—Some tests, made a few years ago with a Le Chatelier pyrometer, showed that at times we had attained 3,000° on top of the carburettor, but I think we do not attain that in everyday practice. I think 1,500° to 2,600° is probably the maximum working heat.

Mr. Barnum—What is it at the bottom of the carburettor?

Mr. Ramsburg—I would not like to say without some reference to my data. It is something in the nature of 1,800°, I think. It depends on the proportioning of the apparatus. If you have a large carburettor and a comparatively small superheater, the temperature at the bottom of the carburettor will naturally be lower than if the carburettor is smaller in proportion to the superheater.

Capt. McKay—I was very much interested in what Mr. Ramsburg told us. It gets back to the fact that he would like to put the oil in as a vapor, and if he wants this high temperature at the top of the carburettor the question naturally arises why should he rob that part of the machine of heat by putting in cold oil; that is, putting it in as nearly a vapor as possible certainly tends to keep it at a uniform temperature. You want it high, and you want to keep it high. That is a very interesting and valuable statement of Mr. Ramsburg. I would like further to know why the trial has not been made, or why they persisted in the use of the cold oil, and what advantage it presents that offsets the possible advantage of the uniform heat in the top of the carburettor?

Mr. Ramsburg—The degree of heat which you can put into the oil, and consider that you perhaps gain 4 gallons of oil per 1,000 feet of gas? You would not heat that oil up, I suppose, any higher than 200°, Captain, would you?

Capt. McKay—700°.

Mr. Ramsburg—If you could put the oil in at 700° it would all be a vapor. That is just what I would like. Under those conditions I would not want 2,900°. I would want, say, 1,350° in the carburettor all the way through.

Mr. Kennedy—Has it ever been tried, or is it possible to successfully introduce the oil at a part of the apparatus nearer the generator than the top of the carburettor. In other words, it seems to me it would materially aid the ignition point, or rather, the time at which you can ignite your blast gases, especially on short runs and very high blast. In other words, if that oil could be gotten in the flue, between the generator and the carburettor, and still arrive at the carburettor top in distributable form, it would to my mind naturally be beneficial. I should like to know if, in the experience of the wider operators, that idea is a fallacious one?

Mr. Ramsburg—I don't see, without having a large quantity of material present to supply B.T.U.'s to evaporate that oil, how you could possibly derive any particular benefit from admitting it back of the carburettor. Of course, we have admitted oil to the top of the generator fire as an enricher, in fact, that was the old practice; but I don't think, by the admission of the oil on top of the carburettor, unless you went back to the top of the fire and worked it out in a different way from which it had ever been worked out before, you would perhaps gain much. Of course, putting it on top of the fire, considerable naphthaline is always formed.

Mr. Doherty—The only reason I ask for a moment, concerns one point that I think might be overlooked. The oil we ordinarily are compelled to work with cannot be entirely vaporized. If you attempted to supply it to a machine as a vapor in some places you would get a deposit of material that could not be vaporized. The only answer I have ever seen to that question is this: If we are going to assume that we are going to take that oil which is the most available for gas making from a commercial standpoint, on account of its cost, it probably means that we are to take an oil having heavy matter in it, which cannot be vaporized, but can be mistified. It seems to me the solution of the problem lies in supplying to the machine a mist, and I see no way of supplying it as a vapor. I always hate to see a road pointed out to a man which may have an obstacle on it which he will not realize until he gets quite a way along it.

Mr. Barnum—When we started to use steam sprays to introduce the oil into the water gas I made a few experiments with the temperature of the vapor put in. We used a long thermometer with nitrogen over the mercury. That was tested and calibrated, and we ran the oil in at 700°. We had previously been running it in at about 200°. It worked first-rate. The advantage gained was that we got a more uniform temperature in the carburettor; instead of having a high temperature at the beginning and a low temperature at the end, it is the uniform temperature you want. If you put in 20 gallons of oil on one run and 50 on the next you are not doing as well as if you put 35 in each run. And the same principle applies to the temperature. But I had so much trouble in keeping the joints tight on the 700° that I dropped to 400°, which seemed to work much better. We hold it there now, and get that temperature by going through an oil heater and then through the gas pipe or coil in the take-off pipe. We had a good deal of trouble in making a coil for the take-off pipe, on account of keeping it tight, and finally settled to making a rather short pipe with large diameter, and let it pass through slowly. We took some temperature at the top and bottom of the carburettor and superheater with Le Chatelier pyrometer, and why I asked Mr. Ramsburg was that we have not been very successful with that pyometer on a temperature over 2,400°, but in our water gas set we do not get any such temperature as that. I place it in the top of the carburettor and leave it there for a run and a blow, in the bottom of the carburettor and then in the superheater. At that time our practice was a higher temperature than that at present, and as I remember the curve at the top of the carburettor varied from 1,300° to 1,900, and at the bottom it was 1,500° to about 1,900°, and in the superheater it remained within 50° of 1,500°. That was on a 7-minute run. We now carry 1,300° at the bottom of the carburettor.

Mr. Miller—I should like to ask Mr. Barnum and Capt. McKay about how much generator fuel they figure the heating of the oil to 700° will save. I think Mr. Ramsburg said he calculated a saving of about 1 pound.

Mr. Ramsburg—No; I said the total amount of heat which was used up in the gasification and vaporization of the oil amounted to but 1 pound of generator fuel—the total heat used up.

Mr. Miller—Some figures read a few years ago (I don't remember them now) bear out the recollections that the heating of the oil figured more than 1 pound; and at any rate, I think a pound of generator fuel saved is a great deal.

Mr. Ramsburg—Excuse me; I don't want to prolong this discussion or use up too much time, but I should like to straighten out a statement that has been misunderstood. When you heat water from zero up to 212° it takes 212 heat units. When you heat that from 212° and make it into steam it takes 966 B.T.U.'s, under which conditions you are taking 4 or 5 times as much heat to vaporize the water as you do to heat it up to the point at which vaporization takes place, in the same way with this oil going in the carburettor. I am not sure that

the ratio is exactly the same, but certainly there is much more heat used up in the vaporization of the oil than there is in the heating up of the oil. The carburettor is solely and purely a vaporizer, under which conditions there could not be any pound of fuel saved by putting the oil into the carburettor hot, unless it were a vapor. There might be $\frac{1}{10}$ of 1 pound saved, but I don't think it would figure out much over that. By putting it in hot you still have to vaporize and gasify the oil, which takes a majority of the heat.

Mr. Miller—The point I make, Mr. President, is practically all of the oil is gasified, when injected at 700°. A distillation test of most any gas oil will show that practically all of it distills over below 700°, and there is only a little residue left.

Mr. Ramsburg—As a vapor, but it would be an exceedingly difficult matter to get the oil in the condition of a vapor.

Mr. Miller—It is vaporized; yes.

Capt. McKay—In handing this question in to the Secretary what I particularly wanted to learn was how to get the most candles per gallon. What it would save in fuel is perhaps insignificant as compared with the possible benefit that might result in improving the use of the oil. What I really want is the candles per gallon.

The President—Can Capt. McKay tell us what it costs to vaporize the oil or raise it to 700°?

Capt. McMay—The interest on the money invested in the coil.

The President—I mean in fuel.

Capt. McKay—Oh, no; Mr. Klumpp just made some figures for us.

The President—I think this question has been very well threshed out. We have completed the programme. I will ask the Secretary if there are any announcements to be made.

The Secretary—One announcement I would make—I am sorry that all the members of the Association are not in the room. I wish to preface that announcement by thanking the gentlemen who have furnished the material for the discussions, both the written papers and the discussions impromptu. The announcement is that next year, considerably in advance of the time for the annual meeting, you will send in your material to the Secretary, if he lives until that time, so that the papers may be printed before the week of the meeting, because it does not leave sufficient time for the slips which are bound to occur in any mechanical and commercial transaction. We were delayed yesterday from the fact that the lantern operator noted in his book March 17 instead of February 17, and he did not discover it until the time when he should have been at work here, which left very little time to make different arrangements. The same thing or a similar thing happened in regard to the illustrations for one of the papers. The cuts were ordered at comparatively short notice. They were not delivered until either yesterday or to-day, to the printer, which was obviously too late. Our printers here in Boston have thus far refused to print papers and deliver them until some time after the copy is delivered to them. They are slow, I know, but you must give them some consideration. So let me put up a plea for getting at this work earlier in the year. I recognize that probably all the members of the Association are busy. In fact, the Secretary has some other duties besides those of the Association. Gentlemen, I thank you again.

A Telegram of Congratulation.

Mr. Prichard—Mr. President, I am reminded that to-day is the beginning of the first meeting of the Southern Association. The New England Association has been the mother of Associations so many years that it really seems as if the old lady was due to have a telegram of congratulation instead of the reverse; but, on the other hand, you must remember that while we are accustomed to having births, the Southern Association perhaps is experiencing a novel sensation and maybe somewhat confused. Therefore, I would suggest that we send to them our congratulation and our wishes for a long life and a useful one.

[Mr. Prichard's suggestion was adopted by formal vote.]

A Belated Question.

The President—We are reminded that we have one more question here which the Secretary will read. It was not received in time to print it. He has written it, so I guess I will have to ask him to read it.

The Secretary—I have attempted to read it several times. I don't know whether I read it right or not. In self defence I will state, however, that the Secretary did not write it or compose it. It is:

> "What is the rate of propagation of the flame in a perfect explosive mixture of air and gas?"

The President—Mr. Doherty, will you answer that for us?

Mr. Doherty—I cannot answer that question, as I have no data with me and cannot trust my memory. No exact figures could be stated unless the specific conditions were known. Some interesting exeriments can be conducted by the use of standardized jets. It is apparent that, where gas is burned issuing upward from an orifice, the flame must propagate downward at a rate at least equal to upward flow of the stream. If the area of the orifice is known, the rate of flow through the orifice may be calculated. By increasing the rate of flow a fluid velocity will be reached that exceeds the rate of flame propagation, and at this point the flame will leave the orifice and will show combustion at a point above the orifice where the stream has widened and the velocity has been reduced to the exact rate of flame propagation. If you use a lava tip the rate of flame propagation will apparently be higher than if a copper tip is used. We know that an increase in temperature increases the rate of flame propagation. As the copper tip conducts more heat from the flame than the lava tip, this fact would seem sufficient explanation for the higher flame propagation where the lava tip is used. Each gas has its own rate of flame propagation, and it is also worth noting that the rate of flame propagation increases as you increase the size of your orifice. In building industrial gas appliances we find it is easily possible to inject our mixture of gas and air at a velocity exceeding the backward rate of flame propagation. The rate of flow required is not uniform, but depends on many conditions. If you do not secure an intimate mixture of gas and air, but have a stream of air and a stream of gas travelling forward side-by-side, your flame will travel backward along the line of contact between the stream of gas and air, even when otherwise your velocity would be too high to prevent backward propagation of the flame if the air and gas were thoroughly mixed. In this case natural conditions present whatever ratio of gas and air which will conduce to greatest rate of flame propagation. If pipes or vessels are filled with explosive mixtures of gas and air the behavior can often be noted by the eye alone, as the flame propagation is exceedingly slow. The kind of material used and the relation between cubical contents and superficial area of the containing vessel play an important part. I would say that this question can only be answered by experiment under exact conditions.

Adjourned.

The President—If there is nothing more we will adjourn. We are adjourned.

[Continued from page 1026.]

PROCEEDINGS, FIFTH ANNUAL MEETING, ILLINOIS GAS ASSOCIATION.

Held in Chicago, Ills., March 17th and 18th, 1909.

Second Day—Morning Session.

Discussing the Paper on Commercialism.

[For the text of the paper, see *ante*, p. 1021.]

The President—Gentlemen, you have listened to a very interesting paper. It is now open for discussion.

Mr. Seidenglanz—I think we will all have to concede that Mr. Bigelow's paper certainly is a literary achievement, although I fail to see many openings left to bring up a discussion on things pertaining to the industry. Commercialism, no doubt, dates back to the time of the creation, but it must have been preceded by the engineer and the manufacturer, for if it had not been for the planning of the engineer and the manufacturing of this great world of ours, there would not have been any need for a commercial department, and if it does date back to that early day, then I would say that a more striking example than the one cited was the selling of Joseph into Egypt. But, seriously, I am somewhat surprised at Mr. Bigelow's effort to reopen the old question of securing the co-operation of merchants in the sale of gas appliances. This plan will doubtless succeed in a city supplied with natural gas, but it must be remembered that such a city is in a distinctly different class from the one supplied with the artificial product. My experience has been that from the beginning up to the present time the merchant as a purveyor of gas appliances (using Mr. Bigelow's expression) is a "dead one," and I believe he will always remain so, even though he were to receive a substantial bonus for his efforts, in addition to a reasonable profit on the appliances sold. I have in mind a city where this effort, covering a period of a number of years, has resulted in absolute failure when there was a

strict adherence by the company to the agreement made with the merchants. We have tried it in our town. We offered to connect free of charge every range sold by the dealers, and to furnish them with all the gas that they would care to use for demonstrating purposes in their sales rooms. They seemed very enthusiastic, but how many ranges do you suppose they sold? One dealer sold 3, and then we took the balance off his hands. His reason for not selling more was that the people preferred coal ranges and gasoline stoves? Naturally they did. There was more profit in it for the dealer. There are two merchants in our town now who sell (I should say carry) gas ranges, but we have ceased to co-operate with them. Why should we? They simply use these ranges as a kind of decoy to get people into their stores, and once inside they will do everything possible to sell them a coal range, or, at the very best, a combination. Furthermore, if this proposition were left entirely to the merchants, how many of them do you think would send a salesman to canvass the city for the sale of gas stoves? They won't even give the gas range a decent chance on their floors. Half the time they can't find them on account of being shoved back into a corner and covered over with a lot of other hardware. I know a case in a large city where a gas company sold ranges and turned the orders over to the merchants to fill. In a number of cases the merchants deliberately sent a man out after the gas company had made the sale and endeavored to sell a combination range. Suppose that, in our endeavors to create a selling organization among the merchants we secure the co-operation of all but one of these merchants, and he puts in a line of inferior appliances, not approved or recommended by us. He sells a range and it does not give entire satisfaction. His answer to the consumer's complaint will inevitably be that it is not the fault of the appliance; he knows it couldn't be that, because that range is the best in the world; consequently it must be the gas; and invariably he will convince the consumer that such is the case. If that consumer only had sense enough to come to us! But he hasn't. He starts out and publishes the fact that the gas is so rotten they can't cook with it. What's the result? I maintain that one dissatisfied consumer can do more harm than 100 satisfied consumers can do us good, and I believe we are mistaken when we think that, by securing the co-operation of a hardware dealer, we secure his goodwill and the goodwill of the public, for his interest in the appliance ceases with the sale, and that is where our troubles are apt to begin. Now, I have called attention to two large companies where this plan has been a failure; also to our experience at Rockford, which, for the sake of comparison, I will call a small company (although I want it understood that we are not very small, and as far as sales are concerned I defy anyone from Illinois to show a better record), but there is a little plant not far from here, in a town of about 10,000 inhabitants, where the hardware merchants were offered a bonus of $5 for every range they sold, with the privilege of handling any make of range they might select, and all the ranges sold in that town to date have been sold by the gas company. But this is a broad subject and one that should create a lively discussion, and no doubt there is someone else here who has had more or less experience in this work. I should accordingly like to hear from the other side. But, in conclusion, I want to ask this: If the failures mentioned were due to the fact that the proposition was not properly handled (and at least two of these cases were engineered by men whose reputation as successful gas men is known from one end of this continent to the other), then just what is the proper way to handle it? I believe those of you who have had the experience of developing the sale of gas and gas appliances will agree with me that the time will never come when the successful gas man will relinquish the sale of appliances to the merchant. I thank you.

Mr. J. C. D. Clark—I did not hear Mr. Bigelow's paper read, but I suppose it was read as printed. It seems to me that the hardware dealers' proposition is something that everybody must work out to his own satisfaction. It seems if you want the hardware dealer to work for the gas company, you have to break him in and make him part of your organization. I do not see any other way that you can expect to have him do business for you. If you undertake to employ a solicitor, you have to break him in, to show him how to do your business, so if you employ a hardware dealer you should educate him just the same as you do your own men. That is the way I feel about it. In St. Louis, in 1903, the hardware dealers were selling all the gas stoves. They sold gas stoves during the months of May and June, then they quit, saying that the season for selling gas ranges was over. Then the gas company said, if you are done, why, we will see if we can sell a few. So they agreed to the proposition. We started out and sold about three times as many as they did from that on to the end of the year. Then we said to them next season: "Now, we will place, in stock in our warehouse, all the gas stoves, you don't need to handle them at all. All you will have to do is write the order and send it in to us. We will deliver the stoves, and connect them, and you will be paid a commission. They thought that was a good proposition. In time they found out we had solicitors working around their stores, they came in and complained about it. We said, "You must hire solicitors." That being new to them, we sent men out to visit them at their stores, and arranged with them to hire solicitors, and they worked along pretty well for a time. A little bit later on, we put in some special demonstrations and substations for them, and finally we got the hardware dealers educated up to the point that when they sold a man a gasoline stove they did not feel right about it. Knowing that gas was the right fuel, the consequence is we worked them around so they did sell a few gas appliances. But you have to keep after them all the time. You must have somebody working with them; you have got to get up schemes, you have to offer prizes, pay them your money, and treat them as part of your organization if you want them to do anything for you. Dealers are different in all towns. In Chicago every nationality is represented in running hardware stores. Having talked to quite a few, I found that which is satisfactory to one is not so to his neighbor. They meet together in associations, and talk it all over, but they cannot agree among themselves as to what they really should have. So, about the only way you can have success is to educate the hardware dealer so that he believes gas is the proper fuel for his customers. In selling a person a gas appliance the seller should make the buyer his friend, so that he will come back and trade forevermore at his store. I do not see any other way you can get the hardware dealers to work for us. This year in Chicago we are going to say to the hardware dealers, you sell our stoves and we will deliver and connect them and will pay you 10 per cent. of the selling price as a commission on the sale. We are going to offer to put in sub-stations for them, where they can receive gas bills from their neighbors and friends. In that way the people are going to come into their stores, and we believe in that way, if they realize that the people are leaving their money there, and that they are making money out of the gas company, that they are not going to attempt to switch the people to gasoline or coal. I think all the dealers will not have the nerve to do it, although some of them may. Of course, there are quite a number of foreigners in this town, and the people to a certain extent depend on the hardware dealers for information. We propose to have men call on them and try to arrange with those people to stimulate the children in the neighborhood by offering them prizes and try to make them as much of our organization as our representatives are. That is part of our plan if we can possibly do it. If that scheme does not work, possibly somewhere along the line we will find one that will. I think Mr. Bigelow's paper is full of suggestions. I do not think it is a fair proposition to criticise anything Mr. Bigelow might bring up and make light of it. I think each one of us has to do certain things for himself every year, and if we have had a poor experience in the past we want a better one in the future. I think Mr. Bigelow should be given a vote of thanks for his paper.

Mr. N. D. McPhail—I was handed this paper some time ago and asked if I would take part in the discussion. I have given it some attention, however, not enough to be able to discuss it as thoroughly to-day as I would like. We have heard a discussion on the situation between the hardware dealers and the gas company. We have a good many hardware dealers with whom we do business and I must agree with Mr. Seidenglanz in the results as obtained by dealing through hardware men. We were paying a wholesale commission of $2 and connecting the stoves free for our hardware men. The result was they were going out and securing business that was absolutely certain to come to us and were doing nothing whatever to increase our output of gas. That did not look right, so we decided to turn the matter over and see if we could not devise same plan of work that would be more effective. We agreed to give them a commission of $2 and connect their stoves free on all new business secured; that is, on every new customer, instead of paying for the range and for new installation. I might say that in the past year our payments to the hardware dealers have not exceeded $25, meaning that they have not sold over 7 or 8 stoves, and we cover a district or we supply in the neighborhood of 160,000 people and 45 or 50 hardware dealers. That does not look good to us and we have practically taken entire charge of the gas range sales of our business. With reference to commercialism, it is to me the product of over production. As soon as a manufacturer produces more goods than will sell them;

selves he begins a modern commercial campaign. The gas companies are exactly in the same condition. Up until about 10 or 15 years ago the gas engineers and the gas men were very much worried to supply gas. It was not to see how much gas they could supply, it was just to supply enough. They were satisfied if they could supply the demand. However, since that time our engineering departments have made such progress that they are able to supply more gas than they can sell. This has led to the innovation of installing a commercial department. Speaking of this I do not want you to think of a commercial agent and his solicitors as forming the commercial department of a gas company. It may be the opinion of some that if the sales of a company do not increase very rapidly it is the fault of the commercial man, but I find that the commercial department consists of every man employed by the company. In fact, every man must have a nose for business if the company is going to get along. A good many companies have taken this into consideration and are enlisting the services of every man employed by the company. Outside the regular commercial department they pay a certain bonus each month to every man who sends in a certain number of tips, or to the man who sends in the largest number of tips where business can be secured. The result is that every man is working. Aside from their work in the commercial department, every man must work in his own department. For instance, if we should get 1 or 2 days of bad gas, the manufacturing department would certainly get the commercial department into serious trouble. On the other hand, if we have a man in the office who is not as courteous and polite as he might be to some of our customers, we will have one dissatisfied consumer who will do us as much harm as 100 satisfied customers will do us good. It will require a good deal of time and attention to satisfy that consumer who has once been displeased. In our case our office department looks after complaints and after the duties of the office. A peculiar condition about consumers is, that they will forget poor service. If there is one time that they are given poor service in the line of gas or in the line of fittings, they can be made to forget the trouble, but if a consumer is once discourteously treated at our office he is liable to remember that, as long as he is a consumer of the company, at every opportunity he is liable to bring it to the front and tell of it. This work, of course, all reflects on the commercial department. That consumer is a knocker, knocking against the commercial department. A good many gas companies have taken this into consideration and are putting the application and complaint and commercial and sales departments under one head, and are achieving very good results. In conclusion I would say that the commercial department is a system of education. The first thing required is to educate your men, in turn educate the consumer, and when you get complete education of the solicitor, of the consumers and the employees of the company, you get perfect commercialism. [Applause.]

The President—We have a few minutes more, if some other member would like to add to this discussion.

Mr. Vilven—Mr. Chairman, speaking of the opposition of hardware dealers, I believe the kitchen range that is placed in the modern home is out of date, and gas companies should do all in their power to prevent persons building new houses from installing a kitchen range. I think in many cases our solicitors could do this by calling in time to secure orders for the piping, and perhaps an order for a modern gas range. If this could be done before the heating plant was installed, it would be a very easy matter to heat the kitchen with the furnace. On the other hand if there is a kitchen range installed, and no other way of heating the kitchen provided, we cannot expect to sell much fuel gas to such a customer, especially during the winter months. Regarding the kitchens which are heated by the kitchen range, I think this is a proposition worthy of our consideration. If there are persons present who have tried installing a water coil in the furnace to heat the kitchen, I would be very much pleased to hear from them.

Mr. F. E. Newberry—Through the kindness of our Secretary, in January this year, I was requested to prepare a paper criticising the article written by Mr. Bigelow. At that time I wrote our friend, Mr. Strohm, to inform him I would be pleased to write a few lines of criticism on this valuable paper, but inasmuch as commercialism in itself is so broad a subject, I feel myself incompetent to talk with any thought of criticism upon so vast a subject. If you will pardon me, I will attempt to analyze in my meager way the paper as read. It is true, as Mr. Bigelow has stated, that commercialism in itself dates from Creation. I cannot, however, agree with Mr. Bigelow as to the first trade. The paper sets forth that Esau sold his birthright, and this constituted a trade with Jacob. Now, in this particular trade there was fraud, jealousy and deception, and, as we are aware, fraud and deception will vitiate a contract. As to this particular trade of commercialism, we have Esau, who was the first-born, and Jacob, the second-born; unquestionably Esau was the first son. Rebecca, the mother, was jealous of Esau and favored Jacob, to such an extent in the eye of his father that she practiced deception in connection with Jacob to defraud Esau and to gain the father's blessing upon the head of Jacob, the second son. The father was easy in this case to deception, as the Bible says, "He was old and his eyes were feeble;" but Jacob, with his cunning brains and with the assistance of his mother, enabled Jacob to gain from the father the blessing that he so sought. This was the year B. C. 1834, so the trade of commercialism we have recorded in Genesis, the 25th chapter and 31st verse. I wish to call your attention to the trade that occurred in the year B. C. 4004, which we have recorded to us in the good Book, in Genesis, 2d chapter, 25th verse. It is the first trade we have any record of, where there was a meeting of the minds, the principals in it being Adam and Eve. Now, I contend that Mr. Bigelow's version of the first trade, or the first trader, being Esau, is entirely wrong, for Biblical history gives the first trade to have taken place as above stated, B. C. 4004, and in this trade we have a meeting of the minds, no deception practiced, everything done open-and-above-board. But, to treat this paper with more seriousness, and to go into the same with more detail, I wish to say that it is true, as Mr. Bigelow states, the alpha of our business is the manufacturer of commercial products in which we deal. I might go further and add that the omega, in my opinion, does not stop with the merchant or the gas company who markets these different appliances to the people. We must here carry this thought still further or right into the homes of our consumers, because they, in my opinion, are omega, and it is indeed a long step between the alpha and the omega; the alpha in its raw state and the omega in the finished product, delivered, if you please, to our prospective consumers. Of this finished product, that we deliver to the unsuspecting public for their future use, there must indeed be great care exercised in the producing of the same, as to the complaints that come from our consumers or the omega as a whole. It might be advisable to say a word in behalf of the manufacturer who produces our gas appliances and markets the same to our door. I agree with Mr. Bigelow upon this point, and wish to state further that I do not think that we, as a gas fraternity, lend to the manufacturer that co-operation which should be necessary to the furtherance and the ultimate success of his business. It is so advertised to-day that a gas range is a coal range with a college education. This, as I believe, comes from our friend, Mr. Roper, also a product of Illinois; but do we, as gas men, treat this most important appliance as such? I say and contend that we do not. You may take a gas range, or in fact any appliance that we handle, but more especially a gas range, treat it as though it had a college education, if you please, which we must agree that it has; but do we, as the marketer of this appliance to the unsuspecting public, treat it as such? I say decidedly, "No." We hire men in many cases who have but slight experience; I might say hardly any, as to the real merits and fundamental working principles of a gas stove. By this I mean men that we send on our wagons to equip this stove suitable for the operating of gas; men who are supposed to know as to the intricate operations of the appliance which they are installing; but you know, gentlemen, as well as I do, that their knowledge as to the inside workings of a gas stove, as to combustion, etc., is limited, and it is along these lines I also wish to contend that we do not put our salesmen into the field to market these appliances, not only stoves but other appliances, with a sufficient degree of intelligence to the public that our solicitors should have. I think, however, we are growing in wisdom along these lines each year, and find ourselves better equipped to deal with these problems and to satisfy the most critical as to the mechanism of the appliances in which we deal. This, indeed, will take time. It costs money to hire men of experience to explain intelligently these details; but, as I have stated heretofore, I think we are on the gain in this respect; and, in looking over the commercial departments of now, we find a vast improvement in the commercial departments of 3 to 5 years ago. As to what Mr. Bigelow terms the three outlet sections of the gas industry, namely, the manufacturer of appliances, the commercial gas man and the merchant who handles gas appliances. I contend, regarding this particular matter, that we leave out one of the most important outlet sections to our business, namely the public, who are the consumers of gas. Take, if you will, the last commercial meeting held in Chicago last year. Here we had the manufacturer of appliances, the commercial gas man and the merchant who handles

the appliances, and I would like to ask, taking all three as a whole or separately, where would your gas appliance meeting have been without the fourth and most important section of our industry, namely, the public? As you well know, every manufacturer of gas appliances and every gas company in the country were furnished free tickets to this show; and why were these tickets given? Were they given for the fact that we desired to have the employees of the gas appliance men visit this particular show? No; they were given to the appliance men, to the commercial men and to the gas men for the fourth and most important section of our industry, namely, the dear public. As you well know, there was a time when the old expression, "The public be damned," was used and practiced to a considerable extent; but that day and age have gone. We now cater to the public and the public are the ones whom we strive to please. As to the snake story alluded to in this paper. I think many of us are dead and don't know it. I think, perhaps, the writer has been dead for some time along many lines, but I always feel, after attending one of these meetings, that I can pick up some bright thought and take it home with me and work it out in my quiet hours, having the satisfaction of knowing that I picked up at least one idea from the last meeting. Speaking with a gentleman a short time ago relative to the way that some members attended these meetings, and as to the real value that they attained from the same, he cited a case to me of where a gas company was written to by a coal company requesting a letter of general recommendation as to the quality of gas coke that their company was furnishing. In due time the letter came back which read as follows: "My Dear Sir—Your communication under date of the 1st at hand and noted. In reply wish to state that we have been using your gas coal for the past year in our plant here, and wish to state that we are getting a yield of 3½ feet per pound as charged, which we consider exceedingly good." You can imagine the feeling, gentlemen, of the coal man upon the receipt of such a letter. He immediately took his hat and coat and travelled to this city post haste. He was very anxious indeed to learn where the remainder of this gas had gone to from some of the best coal that is mined in the Youghiogheny district. It is needless to say that he found it, but here is the point that I wish to bring out in this connection: The manager of this particular plant had been attending gas meetings year-after-year, and for him to send a letter of recommendation, stating that the gas coal as furnished was only producing 3½ feet per pound seems ridiculous, as there is hardly a gas meeting goes by but some paper has some thought in it regarding the yield that coal will produce under favorable conditions. That is why we assemble here to see if, collected together, we cannot pick up and carry home and work out some thought that we can inject into our business to be a money saver and a winner for those for whom we strive. There are a few statements that I might add relative to good fellowship. This good fellowship that formerly existed with the commercial traveller, relative to the marketing of his goods, has long since passed, and the up-to-date purchaser at the present time so governs and regulates his purchases that he purchases absolutely the best and those things most suited for the trade and what the trade demands. There is absolutely nothing in buying the cheap and inferior goods; the best is always the cheapest; and let us so strive in our purchases from our gas appliance manufacturers to go into the working details more and as to the efficiency of the appliances which we purchase, so when we put them upon our floor and say to our prospective customer, "There is the best gas range that ever stood upon four legs," that we know where of we speak, for when that range is set into the home it gives no further trouble. These are the appliances that we care to market to the public. These are the appliances from which we draw our revenue, so let us make them the best. As to specialty lines, not alone engineering, these specialty branches cannot, as we well know, be conducted with success unless there has been that commercial experience, if you please, prior to the specializing. As to a specialist himself, he is indeed small, but with commercialism, he is everything. I might say, as to the golden rule in the commercial business of to day, that we do not find it practiced as in the days of old, but I think to-day that we have more a rule of gold than the old golden rule as taught us by our mothers, and it is in the following of this rule of gold that brings disaster, not only in our lines, but in all lines. Let the salesman come forth with some appliance, and no matter how smooth and cunning he may be in the marketing of his device, it is sure to come up and only retract upon our companies. Therefore it behooves each of us to handle his appliance purchases and the marketing of these purchases to the public with the utmost care, and it is from the source of the alpha to the omega that we must please. Gentlemen, I thank you.

The President—Our time is up, gentlemen, and I will ask Mr. Bigelow to reply to the various members who have spoken.

Mr. Bigelow—In the first place, we must all recognize the fact that, as gas flows through the pipes it is non-productive, but when the match is touched to the burner, you get the effect, just as in the electric lamp, the filament interrupts the even flow, and you get a little bit of opposition, and the opposition means brilliancy, and the brilliancy gives you the result that you are after. Now, then, when it comes to a paper, a paper should be so written as to invite criticism and opposition. Those two things bring results. I am delighted to find that one thing has been accomplished by my paper. One of our friends has been induced to study his Bible, more possibly than he has for years. [Laughter.] He has proved the truth of my statement that there are two kinds of commercialism, constructive and destructive. He has pointed to a very much earlier age than I spoke of, and says that "it was above board, honest and constructive." That which I cited was dishonest and destructive. So in the manufacture and sale of goods to-day, there is constructive commercialism and there is destructive commercialism. One makes for the benefit of the manufacturer, the individual and the neighbor. The other, the destructive, ruins the individual and ruins his neighbor. We are all neighbors, and we owe it to the community, we owe it to our neighbors, we owe it to ourselves, to be constructionists, and not to be destructive. When it comes to the matter of *the merchants and the gas companies*, I said and I say again, I believe the time will come when there will be closer touch between the gas companies and merchants. I believe when that time comes it will be found of great value to the gas companies. Every man that you can have working for you is a desirable asset. Every man that sells some other device to day, and who ultimately, because you have put him closely in touch with yourself, sells a gas appliance, is a desirable asset. How this shall be brought about I am not prepared to say. I don't think that any of us are prepared to sit down and say that we have yet reached the omega in this matter. It is a fact that education brings about results, and we were told a few minutes ago right here that it is a desirable thing to educate your solicitors; and so it is. Now, then, if it is necessary to educate the employees of the gas company, how much more is it necessary to educate a man who is outside of the field of your own organization, but yet is important to you. I claim the time will come when the gas interests will seek to educate the merchants, just as the gas companies seek to educate their own employees. When that time has come, whether the merchant sells or delivers the goods, or how he is in touch with the gas company, he will have become of value to that company, while to-day he is not a valuable asset, as a rule. I believe the gas company—that the gas mind, I will put it that way—can find ways and means by which to interest these men as they never have been interested before. I do not believe that a gas association in this country has ever sent a delegate or delegates to the conventions of the hardware men to gradually work into that department of this great industry, that is, the fuel device industry, to which these devices that we sell to a certain extent belong. I do not believe that any gas association has ever sought to bring the hardware men as a whole closer to the gas industry as a whole. Individuals have worked at this more or less, but it has not been done in any systematic, thorough way. This suggestion may result in a decision on the part of some gas association to do something of the kind, and thus seek to bring that section of the fuel device selling industry a little closer to the great gas industry; and when this is done it will create discussion, and discussion creates thought, and thought creates action, and action makes action, and when people become active then their brains work more freely. When the American brain works something is doing, and I believe that this gas industry is too large, too great, controls too great intellects to sit down and say that the merchant shall have his present way unchallenged, and that we shall not, in a sense in our particular line, control the merchants. I think if proper methods are put into operation that that outlet can in some manner be brought closer to us, and thus become of decided value, rather than a thorn. It was remarked that "commercialism is a product of over production possibly." To a certain extent that is so, but, on the other hand, is it not possible that commercialism is also the product of opposition, or, as we might put it, the selling of another's product, and therefore competition? Competition is the life of trade when competition is legitimate. Now, we have legitimate competition between certain other elements that produce heat and light and the element that we of the gas field sell to also produce heat and light, and I believe that commercialism in our field is to a large extent the outcome of this condition. While I also believe it is

developing to a certain degree because of the vast holders which in some cases are being constructed to contain gas for which we have no present sale. At the same time, I believe commercialism is also a prospective matter. We are building for the future in our commercial department, and as the future develops it will be seen that the commercialism of to-day is a magnificent foundation stone for the great successes in the meeting of competition in the future. I believe, as I have suggested in my paper, that the engineer is the beginning of the commercial side of the gas company, and I believe that the engineer should be in the closest touch with the commercial men of the company. I believe at the same time that the commercial men should feel the need of keeping in the closest touch with the engineer, although there is a line between the two. There is a line there. There is no necessity for taking the time of the commercial man that he might fully understand all of the details of the engineering side, nor is it necessary that the engineer should take his time in order to know all the details of the selling end. At the same time, the organization as a whole, the cycle if you please, embraces both, and that is why I say that the commercial organization in the form of a commercial gas association and an engineering association as formed in the Institute should be in the closest touch. I believe that the two sides are equally important, but neither side can be divorced from the other and yet attain the success that we deserve. [Applause.]

The President—The thanks of the Association are extended to Mr. Bigelow for his able paper.

Mr. G. F. Goodnow—We know the ability of the entertainment committee, although we have not received a full demonstration of this; but with a lively sense of the pleasures to come both from the trip to Joliet and from the dinner which we expect, and the speeches which are to occur afterwards for our mental refreshment, I would like to propose a vote of thanks to them. [Seconded and carried.]

On motion the convention was declared adjourned.

Types of Screens for Gas Works.

[Communicated by "R."]

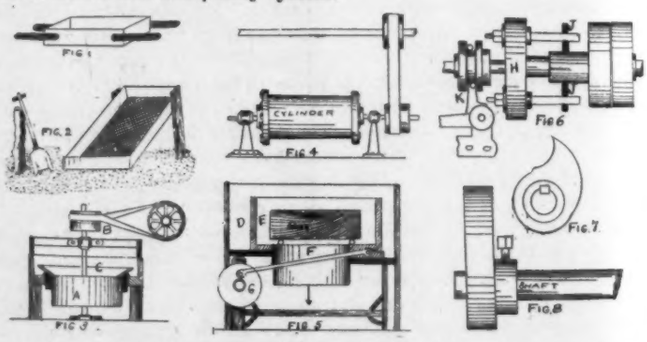
The simplest and crudest form of hand-working screen, shown in Fig. 1, is not used very entensively, although this type of sifting device was very popular years ago. The working of the screen involved manual labor exclusively. Two men grasped the handles, on the sides and ends of the cage, and manipulated the cage back-and-forth with the object of sifting the particles forming the contents. It was a laborious act and seldom resulted in satisfactory results. After a time the sifting was accomplished in stationary devices, arranged as in Fig. 2, in which a slanting screen can be seen. The screen-frame was made of pieces of boards properly jointed and tilted up by means of the back stands. The various desired screen-meshes were selected and securely fastened to the base of the frame. The material for screening had to be shovelled upon the screen.

In time workmen got weary of working the hand sifting devices and devised contrivances by which revolving screens might be worked by belt power; hence there appeared a turning-screen tub, made on the plan presented in Fig. 3. This type of screen consists in the exterior box, so made that the flanged revolving cage can be adjusted on a round corresponding track which circles the interior of the box. At first the smooth base of the ring of the cage flange turned on the equally smooth base of the box flange, but as this caused more or less friction and consumed unnecessary power in working, in time rollers and ball bearings were introduced, thereby eliminating much of the friction.

In the diagram, the cage-flange is marked *C*, the cage-body *A* and the driving mechanism *B*. Then some cylindrical screening devices, for coal yards and gas works, were introduced, one form of which is exhibited in Fig. 4. These styles of screen were made with regular cylinder heads about 3 feet in diameter. From head-to-head there were stretched supporting rods for sustaining the wire screen-stock in proper position for effective screening of the contents of the cylinder. The desired size mesh was selected and the screen-stock secured in place. An opening allowed the introduction of the material for screening. The cylinder was readily revolved by the system of belt connection, shown in the cut. The revolutions ultimately screened the substance. Often a second and third screening followed in graded cylinders provided with screening of stated sizes to get different assortments of screened stuffs.

In recent years it has been the custom to use a design of screening contrivance like that shown in Fig. 5. This screen calls for the erection of an exterior chamber of wood, marked *D*. Planking or heavy boards are used, well braced, and made a convenient size for a workman to work at. The outer box or chamber is provided with a base represented by the black line through the center. This base is hardwood flooring, which extends about the open circle made by the drop or flue *F*. On this smooth flooring the inner cage *E* rests, as shown in the cross-sectional view. Then, inside the inner cage *E* is the sifting-box with the bottom screening. This box is caused to move to-and-fro within the larger box by the action of the wheel and rod *G*. The latter turn-and-push the carrying box to and-fro with each revolution, which movement makes the inner or sifting box shoot back and forth on its rollers. Every trip produces sifting of the material through the wire screen bottom and the material is speedily worked. As fast as the siftings fall they are deposited below, near the arrow point, where a portable box receives them.

Various other designs of screening devices for use in gas plants were noticed by the writer, and some of the methods of operation proved interesting. In one works, where three screens were run, the starting and stopping mechanism was designed as shown in Fig. 6. The shaft is supplied with a steel pin, to receive the projecting pins of the clutch *H*, as shown at *J*, *J*. In order to release the connection, the lever *K* is manipulated. This lever joins with the collar, which is keyed to the shaft. The pin supporting wheel *H* is also keyed to the shaft. The two pulleys, at the right on the shaft as well as the bushing, are free on the shaft and kept in line by collars. The black shaded pin which connects with the clutch pins does not pass through the shaft. This pin is constructed as a part of the bushing of the pulleys and revolves free of the shaft until the combination is joined by the projecting pins of the clutch. Hence the stopping or starting of the screening apparatus is readily accomplished by a device of this kind. On the other hand, some users of screens prefer the common belt and pulley system.



As to the type of cam usually employed for working a lever of a screening cage, the design shown in Fig. 7, is common. This style of cam can lift or push a lever and release the lever over the sharp tip very easily and quickly.

Fig. 8 is given to show how the cam is ordinarily fastened to its shaft in the machine. You will find both set screws and keys used. As the set screw projects the head may catch something, for which reason the key is preferred by many. On the other hand, the key makes it necessary to hold the cam in the positive position on the shaft unless a new keyway is cut. With the set screw it is possible to adjust the cam back-and-forth, and to any desired position. Still the grip of the point of the set-screw is not always reliable and the cam may slip. To avoid this, two set-screws are often applied.

Economy of Electric Current Production in Central Stations.

The *Electrical World* notes that at the May convention of the Nebraska Electrical Association, the President (Mr. E. A. Bullock, Norfolk, Neb.) spoke informally and broadly on economy of production by central electric stations, the basis of this speech being a letter received from a member of the Association who had recently built an entirely new and modern power plant and had discarded entirely the plant before in service. The new plant was designed for relatively high economy as small central stations go. The letter of this member, after a few months' experience in operating with the new plant, called special attention to the fact that about 75 per cent. of the cost of giving electric central station service consists of fixed and investment charges, and that only about 25 per cent. is a variable operating charge influenced by economy of station operation. This member called attention also to the fact that the additional investment necessary to install a new power plant and discard an old one

calls for considerably greater gross revenue to pay interest on the investment and to make the company's bank balance appear as it should.

Mr. Bullock in commenting on the situation indicated by this letter outlined as a generally safe policy for central stations to follow to make additions to the plant in the shape of modern economical machinery, but as far as possible retain the old apparatus as a reserve and for carrying peak loads. This apparatus is usually more valuable to the company which has it installed than it would be to any purchaser of second-hand apparatus. It affords a reserve and peak load carrying capacity at the lowest possible investment. Mr. Bullock stated that he is putting in a 200-kw. condensing steam turbine as an addition to his plant, with which turbine under full load it is hoped (though not too confidently) that the fuel cost will be reduced to ½ cent per kw. hour. He, however, is keeping all of the old apparatus for reserve.

He also referred to producer gas plants as economical sources of power in Nebraska. These plants are being improved constantly and after the first 6 months of service can be relied upon to give good service. During the first 6 months, however, there is much to be learned by the owners and operators. He also spoke of the possibility of putting in a chain grate stoker in his plant, even though it is small for such an installation. He thought that it might make it easier to retain good firemen, especially during the hot weather, as it would relieve the firemen of some hard work. It would not reduce the labor account any. It might also improve the boiler economy.

Mr. H. A. Holdredge, of Omaha, in regard to the use of an automatic stoker in a small plant, expressed the opinion that it might be found hard to handle because of the difficulty of banking fires and of adjusting to changes of load. When the Omaha central station, of which he is Manager, changed from hand-firing to chain grates, a reduction of two-thirds in the boiler room force was made. As to whether any improvement in fuel economy was caused by the automatic stokers, he could not say, because so many other changes were made in the station at the same time.

A member asked a question as to the performance of the Diesel engine using crude oil. Answering this question, Mr. J. R. Cravath, of Chicago, said that this type of engine was capable of producing power at a very low rate per kw. hour, and that it was giving excellent service in a number of plants in different parts of the country. One reason this type of engine is not more extensively used is the high first cost, which for the 250-horse power units amounts to approximately $120 per kilowatt of capacity. This is so high that it has prevented many stations from putting in these engines. They are necessarily very massive on account of the high compression used.

Mr. Charles C. Smith, of Exeter, Neb., reported having operated at his station a Hornsby-Akroyd oil engine for a number of months past. A mixture of one-half crude fuel oil and one-half gas oil is employed. This mixture costs 4 cents per gallon at Exeter when purchased in carload lots. There is a slight flickering of the lamps which he says is not noticeable to the ordinary person. The cost of a crude oil engine of this kind is from $60 to $65 per horse power, as compared with a gas engine and producer outfit, which would cost about $100 per horse power.

Mr. E. V. Capps, of Blair, called attention to the possibility of increasing the capacity of existing plants by the installation of condensers. He has recently done this in his plant. The installation of condensers increases the capacity of the plant from 15 to 20 per cent. and improves the economy about 10 per cent. The cost of plant per kilowatt of capacity is reduced by the installation of condensers, because the additional capacity is obtained cheaper by the installation of condensers than by the installation of additional non-condensing apparatus.

Address of the President (Mr. J. C. McDowell, Pittsburgh, Pa.) of the Natural Gas Association of America, on the Occasion of the Fourth Annual Meeting, Columbus, O., May 18-20.

Although the natural gas industry is one of the new enterprises peculiar to the United States and Canada, and has been wholly developed during this generation, its growth has been phenomenal and it now ranks among the great industries of the age. It is expanding with accelerated speed, having increased during the past 8 years more than in all the preceding years of its existence. The total capital invested in the business now approximates 225 millions dollars, 10 millions of which have been added during the past year. This estimate does not include the capital invested in collateral industries, developed by the demand for material and supplies created by the parent industry.

Industrial Development.—The business has progressed from a precarious commercial enterprise to that of a science demanding skill of the highest order for its proper management.

Great improvement has been made in the past 15 years in the methods of transporting, distributing and consuming natural gas. In this period cast iron pipe, with lead joints, has given place to steel pipe with rubber packed joints; hand regulation to automatic; a perforated pipe burner in a coal stove or furnace to modern appliances; and to-day the most modern steam plants are being supplanted by natural gas engines.

A large army of keen, inventive-men, with minds alert for improvements in their chosen business, is making important changes in methods and devices so rapidly that it is difficult to keep pace with them.

Area of Development.—On a map of the Central and Middle States trace a line from Buffalo to Elmira, N. Y.; to Johnstown, Pa.; to Cumberland, Md.; to Charleston, W. Va.; to Lexington, Ky.; to Cincinnati, to Dayton and Toledo, O.; to Brantford, Galt, Hamilton and Niagara Falls, Ontario; and thence to Buffalo. Within this area, there is a population of nearly 6 millions. Gas pipe line systems, aggregating over 30 thousand miles, supplying nearly every city and village therein almost exclusively with fuel and light, and extensively for generating power.

The extensive mid-Continent fields of Kansas, Oklahoma, Arkansas, Louisiana and Texas, that have been in process of important development during the past few years, are now fulfilling the expectations of the investors and yielding good returns. The immense cement, brick and smelting industries of Kansas owe their existence to natural gas.

Consumption.—The annual consumption of natural gas in the United States and Canada, for the year of 1908, was equivalent to about 9 million tons of coal, and yielded a gross income of about 55 million dollars.

Development During the Past Year.—During the past year important extensions have been made in the Appalachian fields, while the area of the mid-Continent field has been nearly doubled.

Large investments have been made by existing companies in both fields to keep pace with a growing demand for the product. The most extensive new project for the year is that of the Columbia Gas and Electric Company, and the construction of a new line from the well-known West Virginia fields to Cincinnati, O. Its main line consists of 35 miles of 18-inch, and 126 miles of 20-inch wrought iron pipe line, designed to carry 350 pounds pressure, with a compressor station of 7,500 horse power at Kenova, on the Big Sandy. The system has a capacity to deliver 80 million cubic feet per day to Covington, Newport and Cincinnati, with a population of 400,000 or more, who no doubt will appreciate this matchless fuel and express their appreciation in good coin that will result in dividends for which the stockholder is constantly clamoring.

Important and extensive developments may soon be looked for in the mid-Continent Field, where hundreds of millions of cubic feet of gas are developed and the wells shut in, and tens of thousands of acres of productive territory await the drill, while in cities within economic reach of these gas fields a population of over a million is ready to use this household luxury.

Pittsburgh capital and Pittsburgh men have been the leaders in this industry. Companies representing 150 million dollars have their general offices in Pittsburgh, and one business block in that city houses 75 millions of this amount.

The rapid with steady growth of the industry attests its stability. Stockholders in natural gas enterprises are increasing daily; the natural gas stocks have stood the strain of the recent close money market and panic better than almost any other class of securities. The bonds, usually bearing 6 per cent. interest, and retired at the rate of 10 per cent., annually, are an exceptionally good investment. The writer has yet to hear of a single case of a company failing to pay either the interest or the principal of its bonds, and many financiers, heretofore slow to recommend investment in natural gas securities, now realize that, with conservative management, they are among the safest and best investments offered to the public.

It seems a simple problem: Given, the developed gas field, the city within economic distance of the field, its inhabitants waiting to buy; it only requires the capital to connect the field with the consumer to start a mint that will coin gas into gold in a very satisfactory manner. For, with all of these factors joined, the investor owns the product, an independent line of transportation, and has a market for

his product; a combination that does not often exist in any other line of business.

Why are not all of the good, undeveloped gas propositions of the country promptly financed? Surely not for lack of money, for millions of dollars are loaned in New York and other financial centers every week at 1 per cent. But little, if any of it, is going into public service corporations, and but little, if any, will go into public service corporations until the holders of it feel assured that they will be allowed to manage their own business.

During the past winter nearly every State held a legislative session, and in 23 States an attempt was made to pass a utilities act placing public service corporations under a commission to be appointed by the Governor. No corporation should object to regulation, sufficient to protect public interests, but there is danger in the sections of the law proposing to place the control of the physical operation of the plants in the hands of men wholly lacking in training and experience, and subject to political influence.

The man of property has the interest of the country as much at heart as the politician, and he has a right to be heard, although in many State houses he has recently received scant courtesy when seeking a hearing to protect his property. It is fortunate that the hysteria against corporations had exhausted itself before the introduction of these bills last winter to such an extent that not one of them became a law, although in several instances they were made administration measures to fulfill platform pledges. Yet the possibility of such legislation makes the prudent investor very cautious.

Attempts by State legislative enactments to prevent the transportation of gas beyond the boundary of the State has a baneful influence. The difficulties in securing a reasonable city franchise will be a barrier to investment as long as self-seeking politicians are councilmen. The tendency of the public seems to be to soak the corporation in some way. Even the fair State of Ohio imposes a double taxation on natural gas companies that do more for the comfort of the home than any other agency in the State. The recent attempt of one of the cities in Ohio to take advantage of a situation to drive a hard bargain with a gas company will, if successful, unquestionably result in great harm to the State and loss to the investors, by discouraging contemplated investments for the extension of the life of the business.

The American public wants honesty and fair dealing between all parties. There is no other industry more deserving of generous treatment by the public than the natural gas industry, for its use results in a definite and very substantial saving to each consumer, compared with his former expenditure for fuel and light. It can be clearly demonstrated that the aggregate yearly saving to the consumers of natural gas, over the cost of the fuel and light which it displaced, exceeds the aggregate dividends paid to all of the stockholders of the company supplying such consumers. In substance, the consumer, without any investment and with no risk whatever, receives a larger yearly dividend from the company, by reason of the reduced cost of his fuel and light, than the owners of the plant with their investment and attendant risks.

When the fact is fully realized that the consumer has received a greater benefit from the corporation than the owner of its stock, there should result a much more friendly feeling, and the fair treatment to which it is entitled by reason of its service to the community.

Peat Possibilities

We are indebted to the courtesy of Mr. John L. Cochran, Chief of Technologic Branch, U. S. Geological Survey, for the following interesting memoranda respecting peat:

A number of cities and towns in the United States may obtain light, heat and power direct from peat bogs in the near future. The statement is made by Federal experts that millions of dollars' worth of fuel lies undeveloped in the swamps and bogs of the country, awaiting only the genius and business ability of the American before it drives the wheels of progress. Its value, on a basis of $3 dollars a ton, roughly guessed at by experts of the Geological Survey, who have been studying the peat deposits for some time, is more than 38 billion dollars—more money than is represented in all the property, stock, implements and buildings owned by the farmers of the United States.

With the coal supply being used at a tremendous rate, peat is expected to become a most important auxiliary fuel, and one that will prolong the life of the coal itself. An important fact which leads the experts to believe that peat will soon come into quite general use in certain parts of the country, is that it is, as a rule, found in quantities in regions far removed from the coal fields, so far that the cost of transporting the coal amounts to several times the cost of the fuel itself at the mines.

The States containing the greatest quantity of peat are the Eastern Dakotas, Minnesota, Wisconsin, Michigan, Northern Iowa, Illinois, Indiana, Ohio, New York, the New England States, New Jersey, portions of Virginia, North and South Carolina, Georgia and Florida.

A thorough investigation of the peat resources is now being undertaken by the Geological Survey, not only as to the amount of peat and its location, but also its use. Prof. Charles A. Davis, of the Technologic Branch, has general charge of the investigations, while Prof. Robert H. Fernald, consulting engineer in charge of gas producer tests, is endeavoring to find the value of peat as a fuel for heating and power purposes. The latter but recently returned from a trip to Europe, where he investigated the uses of peat, and found the older countries much farther advanced along this line than the United States. Prof. Fernald returns with the belief that peat will soon be extensively used in the United States. In Ireland he found that peat was being used generally for domestic purposes, but not by the manufacturing establishments. "Sweden is dotted with peat deposits, and its bogs are now being extensively utilized for power purposes," says Prof. Fernald. "During the last 8 years new bogs have been constantly added to the list, until bogs producing from 2,000 to 5,000 tons of dry peat for power purposes per year are found on every hand. The consulting engineers who have installed some of these plants are unquestionably working in the right direction, placing the power plant directly in the peat bog and transmitting the electric current to the surrounding towns. The current is being used for manufacturing purposes and also for lighting both the streets and houses. The installation of the power plant in the bog or at the mine has been advocated in this country by the Technologic Branch of the Survey for installation of several thousand horse power only, yet this principle is applied in Sweden to small plants, and may be feasible in certain parts of this country.

"Another development in the line of peat industry which promises splendid returns is the use of peat in by-product recovery gas plants. From these plants both gas for power and sulphate of ammonia can be obtained in commercially paying quantities. The utilization of peat for producer gas, and for the recovery of sulphate of ammonia, is perfecily feasible with American peats. Although the work done on peat at the Survey experiment plant has been limited, it has been demonstrated that gas for power can be made easily from both Florida and Massachusetts peat."

Professor Davis, who has just issued, jointly with Edson A. Bastin, a bulletin on peat, is optimistic on the future of peat, yet he believes the development of the industry should be accompanied by great caution.

"The operation of a gas engine at the experiment plant on peat in one or two tests has shown that this fuel is but little inferior to many grades of soft coal now on the market, and superior to some in the quantity of power gas produced," says Professor Davis. "I believe the day is coming soon when cities located near the peat bogs, and away from the coal fields, will obtain their power and light from peat. I understand that Florida is to have a power plant soon that will use peat as fuel and will transmit the electricity to Jacksonville.

"In the development of this industry, however, it must be remembered that peat contains from 85 to 90 per cent. water, as it comes from the bogs. All but 15 or 20 per cent. can be dried out by exposure of the peat to the air. In burning peat in gas producers to make power gas, this peat will burn successfully with 40 per cent. moisture, which is impossible in a furnace."

"The burning of peat for power, heat or light is but one of its many uses. The by-products of great value include coke, illuminating oils, lubricating oils, paraffine wax, phenol, asphalt, wood alcohol, acetic acid, ammonium sulphate and combustible gases of good fuel value. If used for fuel gas there is enough nitrogen stored in the peat resources of the country to supply 644 millions tons with a value of 36 billion dollars in addition to the gas. Peat is capable of furnishing potential substitutes for wood in various departments of industry, and may relieve to a considerable extent the drain upon the vanishing forests. Paper is now being made from peat in Michigan. Possibly 5 per cent. of the total peat in the United States, or 644,400,000 tons, is suitable for the manufacture of coarse paper and pasteboard, which will reduce the consumption of wood by whatever amount it displaces wood-pulp in the manufacture of such articles."

Manufacture of Nitrates from the Atmosphere.

The *Gas World* notes that at the March meeting of the Royal Society of Arts, that dean of analysts, Prof. Silvanus Thomson presiding, Herr Sam Eyde, of Christiania, read a paper entitled "The Manufacture of Nitrates from the Atmosphere by the Electric Arc by the Birkeland-Eyde Process." The author said that in the Birkeland-Eyde process large quantities of electric energy were applied in the electric arc, while it was previously believed that it was small quantities of energy that gave relatively the best results. His belief was that, however, many systems might be discovered in the future, and whatever improvements any of these systems might effect, with regard either to the product or the method of production, they would all, in a greater or lesser degree, require to employ large quantities of energy in the electric arc. From furnaces no larger than could be held in the hand, and which took an energy of some few horse power, they had attained to types which could take an energy of more than 1,500-horse power, and from absorption apparatus of glass globes of a few liters capacity to absorption towers of granite with a capacity of 600 cubic meters each. With this furnace they had achieved such steady working that it burned for weeks without any regulation worth mentioning. The maintenance of the furnace and its repair were simple, as the most exposed portions, the electrodes, only required to be changed every third or fourth week, and the fireproof masonry every fourth to sixth month. The temperature in the flames exceeded 3,000°, or perhaps 3,500° C.

The nitrous gas produced in the electric flame chambers was partially cooled in steam boilers, and after further cooling thsse were passed on to oxidation tanks, and thence to absorption towers, where nitric acid was formed. The finished nitric acid, which had a strength of about 30 per cent., was collected in granite cisterns, from which it was drawn to what was called the "dissolution works." These consisted of granite vats filled with limestone, over which the acid was poured. This drove off, with violent effervescence, the carbonic acid contained in the limestone, while the nitric acid took its place, and formed a watery solution of nitrate of lime or calcium nitrate. This solution of nitrate of lime was pumped into vacuum evaporating apparatus. The concentration of the nitrate solution in the evaporizing plant was continued until the specific weight of the liquid at a given temperature showed a content of 13 per cent. of nitrogen, when it was pumped into solidification chambers. After some time, the nitrate stiffened into a brittle, crystalline mass, hard as stone. This was broken up into lumps, and was taken to crushing machines, which reduced the mass to a granular state, ready for packing into barrels.

In the course of the process, nitrite of soda was also produced, and this was used as the raw material in the manufacture of certain kinds of aniline colors. In the entire process of manufacture, both of nitrite and nitrate, no coal was used; all the machinery was worked by electric power, and for heating and evaporating the nitrate and nitrite solutions, the only steam employed was that obtained by the hot gases passing through a system of steam boilers.

In recent years, a number of well-known men and institutes connected with agriculture had undertaken numerous experiments for the purpose of testing the effect of the nitrate of lime under various climatic and other conditions and on various kinds of soil, and all experiments had fully confirmed the supposition which was held forth by men of science when the new manure first appeared, viz., that 1 pound of nitrogen in the form of nitrate of lime had the same effect, both in quality and quantity, as a similar amount of nitrogen in the shape of nitrate of soda, or, in other words, that nitrate of lime was equal to nitrate of soda as a manure. At times, variations might be observed one way or another, in one case in favor of the nitrate of soda, in another in favor of nitrate of lime. But, especially in soils deficient in lime, the nitrate of lime had proved superior. The average results of three trials of nitrate of lime with oats, made by Mr. James Hendrick, chemist to the Highland and Agricultural Society, of Scotland, had been:

	Yield Per Acre.			
	Grain.	Straw.		
	Lbs.	Cwt.	Qrs.	Lbs.
1. No manure	2,348	33	0	21
2. Phosphate and potash only	2,532	37	1	6
3. Same as 2 with nitrate of soda	2,774	41	3	1
4. Same as 2 with sulphate of ammonia	2,774	41	3	24
5. Same as 2 with nitrate of lime	3,121	43	1	13

Bureau of Information, The American Gas Institute.

Under the direction of the Institute it has been decreed: 1. That the privilege of submitting questions be limited to members of the Institute. 2. Neither the Board of Directors of this Institute, nor the Institute as a body, make themselves in any way responsible for the statements of fact or expressions of view given out by the Bureau of Information.

BUREAU OF INFORMATION, THE AMERICAN GAS INSTITUTE,
HEADQUARTERS, 1943 COMMERCIAL NATIONAL BANK BUILDING.
W. A. BAEHR, Chairman. CHICAGO, ILLS., June 9, 1909.

Question No. 10 of the Bureau of Information was as follows:

"Can the Bureau of Information inform me if there is any particular kind of anthracite broken coal particularly adapted for water gas manufacture? If so, from what region or vein is this coal mined?"

This question was one of the early ones submitted to the Bureau and has not been answered, owing to the fact that a great deal of experimental work was at first undertaken in connection with it. The deeper the experimenters got into this work the more certain they were that they could not give a thorough statistical answer. Finally, an answer at-large was submitted to us by Mr. W. H. Fulweiler, of the United Gas Improvement Company, of Philadelphia, and the Bureau accepts this answer as a satisfactory one. The Bureau, itself, will not prepare any other answer to this question.

ANSWER-AT-LARGE TO QUESTION NO. 10.

By Mr. W. H. Fulweiler, United Gas Improvement Co., Philadelphia, Pa.—"Baldly, the answer is 'No.' We believe that the method of buying coal on the analysis basis is the only proper one, and that coals may come from widely differing fields, yet, if they present certain favorable characteristics, taken in connection with their delivered cost, they may be considered as equally good fuels for water gas manufacture. In other words, we believe that the coal that yields the maximum useful amount of carbon, with a favorable ash composition, at a minimum cost per unit of carbon so delivered, is the most suitable fuel. Consequently, our following reply relates to the manner in which the constituents of a coal affect its value.

"The constituents and properties of an anthracite coal that are factors in its employment as a fuel for the manufacture of carburetted water gas are, in the order of their importance:

"1. The percentage of fixed and volatile carbon.
"2. The percentage and composition of the ash.
"3. The size and behavior of the coal on heating.
"4. The percentage of moisture.
"5. The percentage of sulphur.

"Since we use our fuel as a source of carbon, its value must depend primarily, other things being equal, upon the percentage of combustible carbon carried by the coal in question. Combustible carbon is present as volatile combustible and fixed carbon. The ratio between the fixed carbon and the volatile combustible is used as a basis in the classification of fuels. Hard, dry, anthracites have a ratio of from 28–13, with an average of about 21, and we believe that a good generetor fuel should belong to this class, thus having not more than 7 per cent. volatile combustible when calculated on an ash and water free basis.

"With this limitation, we may in general consider that the value of a coal is proportional to the percentage of combustible carried. Even though volatile combustible may be liable to partial loss in blasting, nevertheless, because its calorific power is somewhat greater than that of fixed carbon, we feel that within the above limits (7 per cent.) it may be considered the equivalent of the same weight of fixed carbon.

"The presence of ash is a detriment in two ways: It replaces combustible carbon, and its presence necessitates more or less frequent cessation of operation for its removal, thus causing a loss of capacity, labor, combustion during cleaning, and a direct loss of carbon removed and lost during this operation. Although the degree of care taken in operation will greatly influence results, we believe, from calculations and experience, that in practice each 1 per cent. of ash will probably result in wastes and costs that are the equivalent of 2 per cent. of carbon in the fuel. Thus, a coal containing 10 per cent. of ash would only deliver the equivalent of 80 per cent. of the carbon compared to a coal having no ash.

"Commercial anthracites all contain some ash, running from 4.5 to 20. Up to 10 per cent. we believe that the value is depreciated in the above ratio of 2–1, and that a first-class fuel should not contain over 10 per cent. ash, but coals containing 12 per cent. or even somewhat higher can be handled satisfactorily. The composition of the ash is quite as important as its volume in influencing the value of the coal for generator purposes, although but little attention is generally paid to this point. We believe that the most satisfactory operation is secured with an ash having a high fusing point. A number of formulæ have been proposed to determine this from the chemical composition, but they all fail to give satisfactory results when applied to ashes having percentages of iron, magnesia and alkalies totaling over 10 per cent. In general, we believe that we desire an ash having high and nearly equal proportions of silica and alumina, with very little, if any, calcium, and the lowest possible percentages of iron, magnesia and alkalies. Percentages of silica or alumina below 30, iron above 15, calcium above 10, alkalies or magnesium above 3, should generally be looked upon with suspicion. As iron is the usual flux that reduces the fusing point of the ash, the

presence or absence of the reddish color it imparts may frequently give the clue to its character. Generally, the white or grey ashes are the more infusible.

"The following analyses of good, fair and bad ash may be of interest:

	Good.	Fair.	Bad.
Silica, SiO_2	54.67	46.23	46.40
Alumina, Al_2O_3	41.95	31.93	16.45
Iron oxide, FeO	trace.	14 54	18.15
Lime, CaO	1.82	5.04	11.80
Magnesia, MgO	1.46	2.26	4.63

"The composition of the coal is somewhat affected by the size, the smaller sizes running considerably higher in ash and correspondingly lower in fixed carbon. The coal should not decrepitate or break up when heated, as this clogs the fuel bed and reduces the capacity. While this is quite noticeable in the Welsh anthracite, it is only occasionally observed in American varieties. The percentage of moisture is a direct loss, both as displacing combustible carbon and owing to the fact that this water must be evaporated and the vapor heated to the temperature of the superheater top. Each 1 per cent. of moisture will require about .11 per cent. of carbon to evaporate and heat it so that 1 per cent. of moisture reduces the value of the coal an equivalent of 1.11 per cent. of combustible carbon.

"The percentage of sulphur is not so important in generator fuel as it is in gas coal, as only about ½ of the total sulphur is volatile, and about ½ of this goes into the illuminating gas. Sulphur usually varies from .4 per cent. to 1.5 per cent., but as high as 3 per cent. have been found. In a first-class coal it should not run over 1.1 per cent.

"Having thus briefly reviewed the different constituents as they affect the suitability of a coal for generator fuel, it may be of interest to very briefly consider the sources of anthracite supply and the general characteristics of these coals. In the United States anthracite coal occurs in a number of localities other than Pennsylvania, average analyses of these coals being as follows:

	Rhode Island.	Massachusetts.	Arkansas.	Colorado	New Mexico.
Moisture	8.36	2.05	1.06	0.72	2.90
Volatiles	6.09	4.99	8 41	7.62	3.18
Fixed carbon	73.23	76.96	75.43	87.51	88.91
Ash	71.68	15.44	11.75	4.51	5.21
Sulphur	0.64	0.56	3.34	....	....

"Similar information concerning Pennsylvania coals is given in the following table (taken from the Geological Survey), which gives the characteristics of the different veins as they occur in the 5 groups of the three general fields, viz.: The Wyoming, which includes the Northern and Loyalsock; the Lehigh, including the East Middle and part of the Southern, and the Schuylkill, which includes the West Middle and the remainder of the Southern field. It will be noted that even a given bed of coal will vary in its analysis as it appears in different fields:

Field.	Grouped.	Bed.	Moist.	Vol.	Fixed Carbon.	Ash.	Sulphur.	Ratio Fixed Carb. Vol. Comb.
Wyoming	Northern	Mammoth	3.42	4.38	83.27	8.20	0.73	19.00
	Loyalsock	"B."	1.30	8.10	83.34	6.23	1.03	10.29
Lehigh	E. Middle	Wharton	3.71	3.08	86.40	6.22	0.59	28.07
		Mammoth	4.12	3.08	86.39	5.92	0.50	27.99
	Southern	Primrose	3.01	4.13	87.98	4.38	0.51	21.32
Schuylkill	W. Middle	Primrose	3.54	3.72	81.59	10.65	0.50	21.93
		Mammoth	3.16	3.72	81.14	11.08	0.90	21.83
		Black Mt.	3.04	3.95	82.66	9.89	0.46	20.93
		Seven-Ft.	3.41	3.99	80.81	11.23	0.51	20.32
	Southern	Mammoth	3.09	4.88	83.81	8.18	0.64	19.62

The above analyses were made some years ago. It is probable that the analyses of the average coals to-day are not so good.

Question No. 53.—"What is the best method employed for taking candle power of illuminating gas with a bar photometer? Which is preferable, a star disk or the circular grease spot?"

ANSWER TO QUESTION NO. 53.[1]

By Dr. Arthur H. Elliott, Engineer-Chemist, Consolidated Gas Company, New York City.

"I have found, from large experience, that a 60-inch photometer bar is the best; also, the disk which I prefer is a star, with 24 points on it. I have no use for the circular grease spot, as I find two men cannot read alike with it. I have tried this with a number of my assistants, of whom I have 16, and have found that the star disk read for definition at the points is much the better to use. You will find two men agree within $\frac{1}{5}$ of a candle if you read the points for definition, even when the colors of the lights are very different, such as the Hefner lamp and the Welsbach mantle. I use a piece of calendered paper in which the star is cut out, and on the face of this paper, on each side, a sheet of nearly white tracing cloth (the whitest you can buy) is placed under the glass disk."

1. This answer is accepted by the Bureau of Information as the official answer.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. C. H. DUNBAR has kept to his work with such a will that the increase of the business of the Houston (Tex.) Gas Company has been so marked in the past twelvemonth that he has been obliged to go before his proprietors with the request for a sum sufficient to greatly add to the capacity of the plant. These gentlemen, with a celerity quite unlike that displayed by the owners of many other and larger gas plants, hardly asked him another question save did the outlook justify the expenditure. His affirmation of the needs was followed by the order, to go ahead and live a trifle beyond your needs. General Manager Dunbar forthwith went into the market places and the result is that the Gas Machinery Company, of Cleveland, O., will construct for the Houston folks a 10-foot set of water gas apparatus; also, a large addition to the purifying machinery.

WE are indebted to the attention of Mr. J. M. Winterbotham, Secretary of the Railroad Commission of Wisconsin, for a copy of the Proceedings of the Commission for the year 1908. The Secretary is to be complimented upon the excellent typographical get up of the book. As to its matter, we shall have something to say in the near future.

"TOM." FISHER, if he is wise, and few who know him think him otherwise, would do well to remember that Mr. Sylvester Watts, of Columbia, Mo., will be in Washington, D. C., shortly—in fact, he should be there prior to this.

MR. ALBERT STRITMATTER, Secretary of the National Gas and Gasoline Engine Traders' Association, informs us that the annual meeting of the Association will be held in South Bend, Ind., the 22d, 23d and 24th inst. Headquarters will be in the Oliver Hotel. Mr. Henry T. Wilson, of Middletown, O., is President of the Association.

MR. STEPHEN CROSBY, formerly Assistant Superintendent at Racine, Wis., and latterly in the employment of the Case Threshing Machine Company, has been appointed to a responsible position on the staff of the Minneapolis (Minn.) Gas Light Company.

TIME and death have certainly wrought havoc in the Board of Directors of the Milford (Mass.) Gas Light Company, in the twelvemonth, for in that period two of the Board died and a third (Mr. Joseph Banniug, who was also President of the Company) resigned both places late last month—the deceased Directors were respectively, Messrs. L. H. Cook and M. B. Johnson. At a special meeting of the survivors of the Board, Mr. Geo. W. Ellis was named to succeed Mr. Bancroft, Mr. C. A. Cook replaces Mr. L. H. Cook and Mr. H. A. Brown succeeds Mr. Johnson.

"F. A. M.," writing under date of the 2d inst., says: "Beginning yesterday the new management assumed charge of the Willimantic (Conn.) Gas and Electric Light Company, with Mr. F. C. Slade (the brother of Mr. R. E. Slade, Manager of the Hartford City Gas Light Company) in charge. The notice given to Mr. Church and Mr. Noyes, both of whom have given good service here in the Company's employ for many years, that they would not be retained, was, to say the least, of an order short and sweet. The control is in the Young syndicate of Waterbury, Conn., Messrs. Mason Lewis & Co., of Boston, having parted with all their interest in the concern. It is likely that quite some reconstruction work will be done on the gas plant this summer."

MR. W. THOMAS, of Vancouver, B. C., informs us that he has disposed of his interest in the Thomas producer gas patent systems to the Northern Gas and Power Company, in so far as these patents are concerned with Canada, Great Britain and the United States.

MR. A. F. TREVOR, formerly at Chattanooga, Tenn., has been appointed Superintendent of the gas department of the Denver Gas and Electric Company, during the absence abroad of Mr. M. E. Malone.

THE Utah Gas and Coke Company, of Salt Lake City, Utah, will this week conclude a series of 12 demonstration lectures on cooking with gas, the lecturess being Miss Anna Virginia Miller, of Kansas City, Mo. The demonstrations were made in the very well suited premises at Unity Hall, 138 South Second East street. The lectures were delivered on 4 nights of each week, and our word respecting them (which goes to 9th lecture) is that no other function conducted in the big city of Salt Lake was one-half as successful as these affairs have been. The attendance was in every sense representative of all the social grades here, and some of the audiences were positively enthusiastic in their awarding praise to the lecturess. To copy from the programme, "All dishes will be served to the audience, and all the recipes may be had in printed form."

MR. THOMAS B. SMITH, in the employment of the Elizabethtown (N. J.) Gas Company since 1866, died at his home in that city the night of the 3d inst. He was in his 58th year, and entered the employment of the Company (his father, Peter Smith, was then in the service of the Company) as office boy, and thus on in succession to higher duties, until he had reached the responsible position of head bookkeeper, which position he was acceptably filling when the fatal summons came. He was a faithful, painstaking employee, and was one of the best known men in Elizabeth. He is survived by his widow, three daughters and two sons.

THE complete organization of the Great Falls (Mont.) Gas Company is as follows: President, George H. Stanton; Vice President, Arthur W. Underwood; Secretary, Edward C. Kohlsaat; Treasurer and General Manager, E. A. Potter; Local Manager, W. C. Wones; Directors, the officers and Mr. H. W. Hanley. Of these, Mr. Underwood is a prominent Chicago attorney, and Secretary Kohlsaat is a son of Judge Kohlsaat, of the National Federal Bench.

MESSRS. A. B. LEACH & CO, are putting on the market $3,000,000 first mortgage, 5 per cent., sinking fund bonds of the Cincinnati Gas Transportation Company, the principal and interest of which are guaranteed by the Cincinnati Gas and Electric Company.

THE proprietors of the Covina (Cal.) Valley Gas Company have arranged to extend their lines to and through the outlying settlements of Glendora and Azusa.

WE are in receipt of the first copy of a contemporary, having the the title of the "Canadian Heating and Lighting Journal," and which is to be published monthly from the premises, 176 Victoria street, Toronto. It is to be issued monthly, at the subscription rate of $1 per year. Its Managing Editor is Mr. John A. Fullerton, and the business management is under the direction of Mr. George H. Honsberger.

A CORRESPONDENT writing from New Haven, Conn., under date of the 8th inst., says: "Mrs. Helen Armstrong has just closed a week's engagement with the Torrington (Conn.) Electric Light Company. The Assembly Room in the City Hall, seating 600, was crowded each afternoon. A feature of the lectures was the attendance of a class of 30 young women from the Torrington High School."

SEALED proposals are called for by the Savannah (Ga.) Gas Company for as many of its first mortgage, 5 per cent. sinking fund gold bonds as the sum of $19,706.66 will purchase. The lowest price (not exceeding 105 and accrued interest) will be accepted, and the time for offering will cease at 3 P.M. of the 30th inst.

THE Peoples Light Company, Davenport, Ia., has awarded a contract for the placing of 4 benches of 9's to the Parker-Russell Mining and Manufacturing Company, of St. Louis, Mo. This equipment will replace the benches of 6's heretofore under fire.

THE Chattanooga (Tenn.) Company will expend a large sum this year on main extensions, the major portion of which will be put down in 3 of the additions to the city, that have made a really great growth the past 5 years. The new business department (Mr. W. S. Chapman) will have a royal chance to make good this season in Chattanooga.

MR. FRED. D. STOCKS has been appointed inspector of the Gas and Electric Department, Holyoke, Mass.

A RUMOR which is not as gossamer-like as "news" of such sort usually is, comes to us by way of Boston, under date of the 5th inst. It is in the form of a question: "Is there any truth in the rumor that Mr. Louis A. Coolidge, formerly of Boston, and latterly personal representative of Mr. George B. Cortelyou at the late Chicago convention of the Republican party, is to assume a responsible position with the Consolidated Gas Company, of your city? Have you no local talent available to occupy all the high places in the Consolidated Gas Company's autonomy?" As to the first part of the query, our reply must be that we do not know; as to second part, yes; in plenty.

ADVICES direct from Easthampton, Mass., under date of the 6th inst., assert: "Negotiations are underway between the Easthampton Gas Company and Peabody & Davis, of Boston, with respect to the sale of the plant of the local Company to the Connecticut River and Power Company, with every prospect that the trade will shortly be completed."

MR. R. L. COBB sends the following resolution which was recently introduced to the attention of the Village Trustees of Bennington, Vt., by Trustee Nash: "Moved, That the Board of Trustees grant permission to the Bennington Gas Light Company to increase the price of gas in the village of Bennington from $1.50 per 1,000 cubic feet to $1.90, with a discount of 15 per cent., if paid on or before the 10th day of the month following consumption. And it is further moved that this resolution shall remain in force until the mortgage debt of the Company be fully paid, when the price of gas shall be reduced to $1.75 per 1,000 cubic feet, with the discount before stated, if paid on or before the 10th day of the month following consumption."

"V. W.," writing from Vincennes, Ind., under date of the 31st ult., says: Perhaps you think that because its name is rather hard, even on "good pronouncers," to clearly accentuate, that the people who live there are not up to the possibilities of a location. Some time ago our blooming Mayor of South Bend, Ind., Mr. E. J. Fogarty, in looking over the situation, his object being the selection of a site that might hereafter be convenient for one purpose or another, leased the site owned by the South Bend and Mishawaka Gas Company, at Vistula avenue and Johnson street. The time the lease has to run is 75 years, and the rental is to be $7,500 per year.

THE Gas Bench Construction Company, of St. Louis, informs us that it is installing new generating capacity for the Danville (Ills.) Street Railway and Light Company—one of the McKinley group of gas plants—the contract calling for the placing of 3 new benches of 9's, full depth furnaces. Other recent orders for benchwork in Illinois closed by the Gas Bench Construction Company are at these points: Sterling Gas and Electric Company, De Kalb County Gas Company, and the Galva Gas Light and Coke Company.

THE Citizens Light, Heat and Power Company, of Eagle Grove, Ia., has been granted an injunction restraining the city authorities from enforcing an ordinance reducing the gas selling rate to $1.25 per 1,000 cubic feet, a cut of 25 cents per 1,000, the injunction to act as a stay pending the final determination, under the general law of the State, whether or not the reduced rate is confiscatory in its nature and action.

A PERSONAL correspondent in Jacksonville, Fla., who is the proprietor of a large store in Jacksonville, and who is in no sense a gas man, save in respect that he is a long-time personal friend of our Mr. Cunningham, incloses this mention, which is surely self-explanatory: "The Jacksonville Gas Company is certainly one of the liveliest, up-to-date business concerns in the country, and Mr. H. B. Hoyt, its efficient Manager, has infused into his employees his spirit of enterprise, push and thoroughness. Whenever any work is promised for completion by this Company it is completed on the time set. An instance of the truth of this assertion was well put forth one morning last week. An 8-inch main had to be laid on Riverside avenue over the viaduct last week. The distance was about 200 feet, and it had to be done quickly, for the residents of the Riverside section had to have the gas at 8:15 A.M. The Company got busy, and in 1¼ hours the ends were hooked up and the supply went on serenely. The job had to be seen to be fully appreciated, but it was smoothly and quickly accomplished, to the complete satisfaction of the not-far-from 1,000 consumers who dwell in the Riverside section."

WHILE this is not official, it may be taken *en masse* as being not far from the fact: "Shareholders of the Denver Gas and Electric Company have authorized the management of that Company to organize a new corporation, to be known as the Denver Gas and Electric Light Company, which will acquire and consolidate the various properties and subsidiary Companies owned by the present Company, and the issue thereon of $25,000,000 general mortgage 5 per cent. bonds. Of the bonds, $7,500,000 will be set aside to retire the present outstanding bonds. The remainder will be sufficient to provide for the needs of the Company for a long period of years."

ANOTHER budget respecting the sale and purchase of the Willimantic (Conn.) Gas and Electric Light Company may be taken as supplementary to the item given elsewhere in these columns: "Mr. Alexander J. Campbell, Manager of the New London (Conn.) Gas and Electric Light Company, will represent the new interests in a supervisory capacity, having general charge in Willimantic as well as in New London. The General Manager will be Mr. F. C. Slade. Former President J. F. Church and Secretary C.W. Noyes will have no active connection with the Company."

SUPERINTENDENT W. H. WILLIAMS, of the Kennebec (Me.) Light and Heat Company, has announced that the contract for laying the gas main between Hallowell and Gardiner had been awarded to Mr. John E. Palmer, of Boston. The line will be not far from 6 miles long. Screw pipe will be used.

THE new selling schedule which became effective in gas supplied in Spencer, Mass., ranges between a maximum of over 10,000 cubic feet per month and a minimum of $1.90 per 1,000. The former means $1.90, the latter $1.20 per 1,000. The minimum monthly charge meanwhile will figure at 50 cents instead of 25 cents per 1,000.

The Market for Gas Securities.

The market for city gas shares was extremely dull in the interim, the change being only in small fraction—½ down. There was a good lot of the stock sold yesterday (Thursday), and from what the writer can conclude from that which he has pieced together recently, a swift move, of the upward kind, is due. If things go as it looks from an adjustment of the glass by an outsider, Consolidated should sell at 175 before August 1st. The general situation is favorable to the buyer.

The Standard Company (N. Y.) will pay 3 per cent. on its preferred the last of the month; and the U. G. I. will disburse a regular quarterly dividend of 2 per cent. the 15th prox.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JUNE 14.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital*	*Par.*	*Bid.*	*Asked.*
Consolidated Gas Co.	$73,177,000	100	143⅝	143¾
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	8,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101¼
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	100	101
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	138½	140
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	92
Yonkers	999,650	500	130	—
Out-of Town Companies.				
Bay State	50,000,000	50	1½	1¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	60	60¼
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	99,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¼	91
Preferred	2,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,500,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated, Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	881,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	92	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	—	100
Preferred	2,500,000	100	60	90
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,870,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108½
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	64	64¼
Preferred	25,000,000	100	91	91¼
Montreal Gas Co., Canada.	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	58	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	115⅝	115¾
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	2,600,000	20	343¾	347½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	230	—

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., June 9, 1909.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 15th, 1909, to stockholders of record at the close of business, June 30, 1909. Checks will be mailed.

1775-3 LEWIS LILLIE, Treasurer.

Position Wanted
As Superintendent,

By a competent gas man who has had practical experience in all branches of the business, both coal and water gas. At present employed. A-1 references.

1755-tf Address, "R. C.," care this Journal.

Position Wanted.

Married man, 30 years of age, 16 years' experience in office work and the manufacture and distribution of artificial gas, also experienced in the distribution of natural gas, desires position as superintendent of gas company. Middle or Western States preferred. Address, "SUPT.,"

1775-2 Care this Journal.

Position Wanted
By Works Foreman.

Sixteen years' practical experience in the manufacture of water and coal gas and distribution of same, both high and low pressure. At present employed on gas construction work. Want to make a change. Am married. Free on July 1, 1909. Address, "Y.,"

1775-2 Care this Journal.

Situation Wanted.

An experienced business manager of Eastern gas company would like new location in the South or Middle West.

1775-2 Address, "J.," care this Journal.

Position Wanted
As Foreman in a Coal Gas Plant,

By a young man, in a town of 10,000 to 20,000 population. Can give good references. Address, "WEST,"

1775-1 Care this Journal.

Position Wanted.

Do you need a man who knows the gas business from one end to the other? If so,

1775-2 Address, "P. P.," care this Journal.

WANTED,
Gas Manager for Small Town in Middle West.

Must understand and be able to handle bookkeeping, manufacture and distribution of water gas. State age and experience. Salary to start, $75 per month.

1774-2 Address, "Q.," care this Journal.

WANTED,

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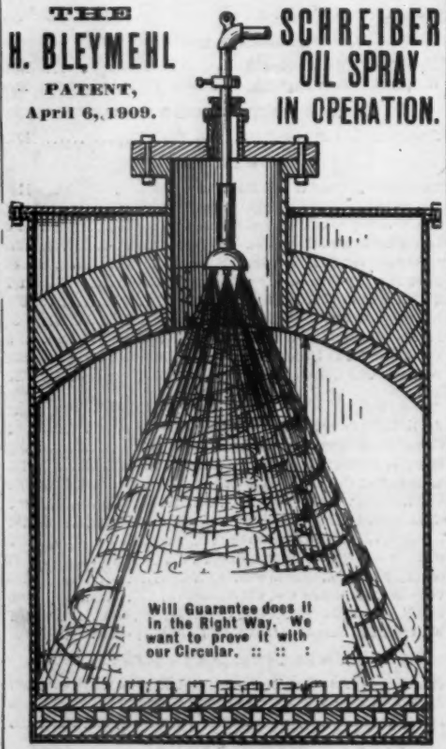

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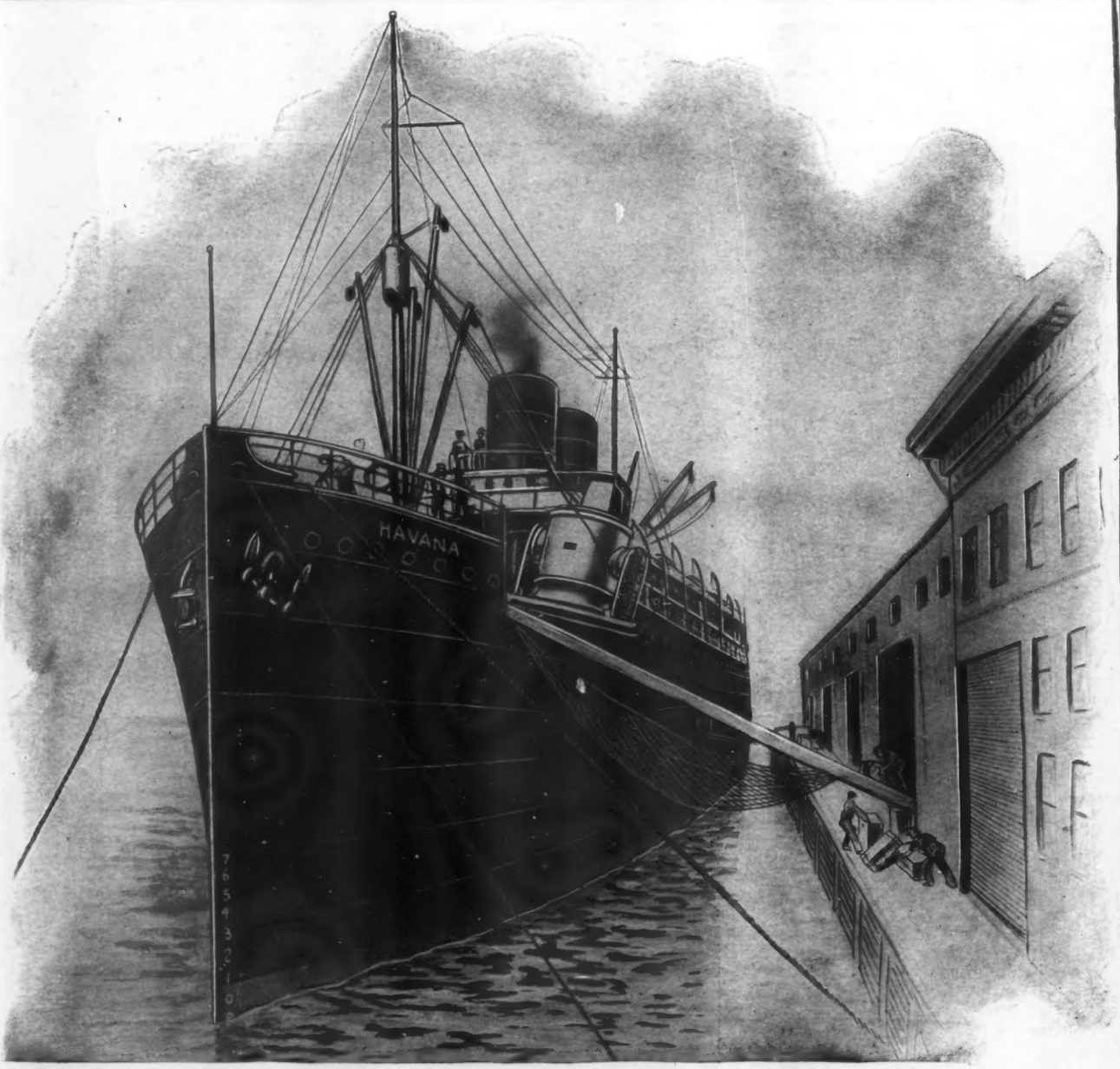

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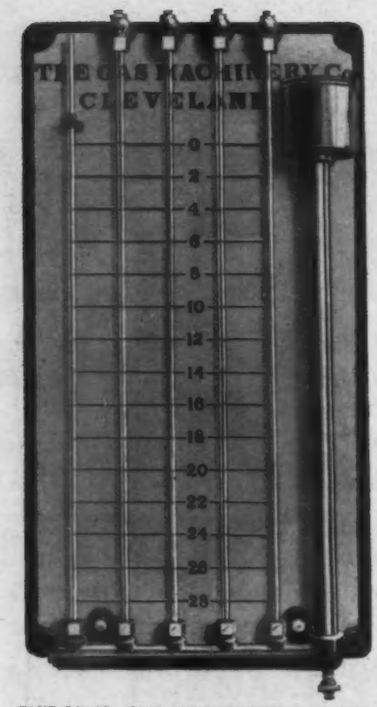

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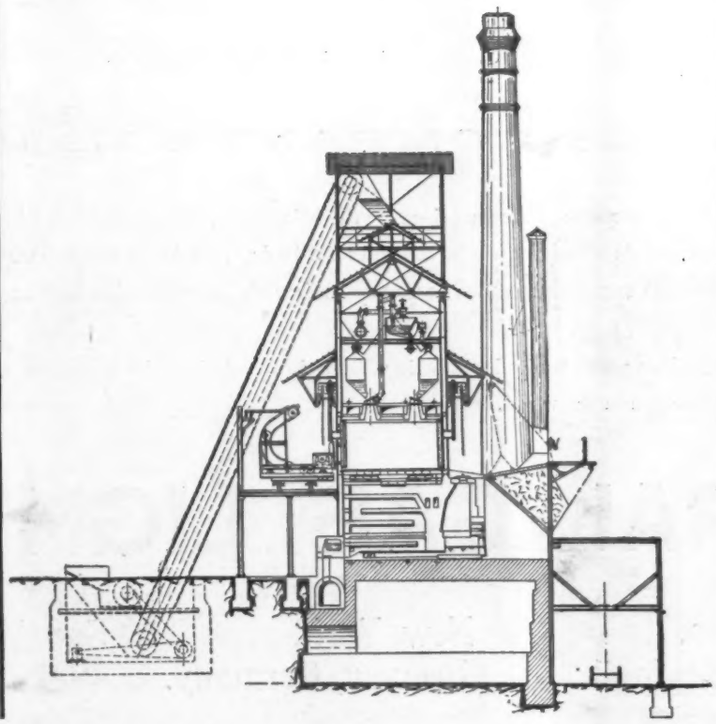

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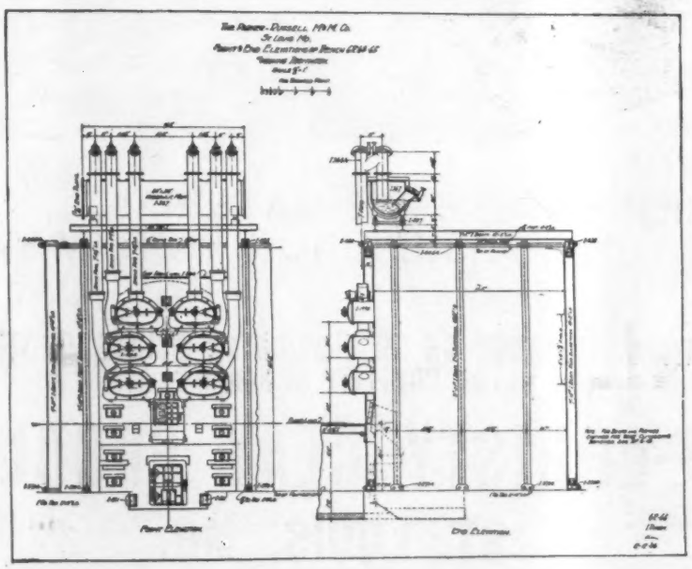

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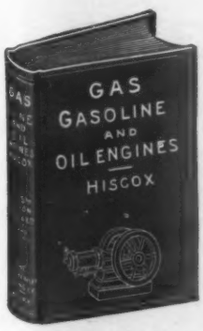

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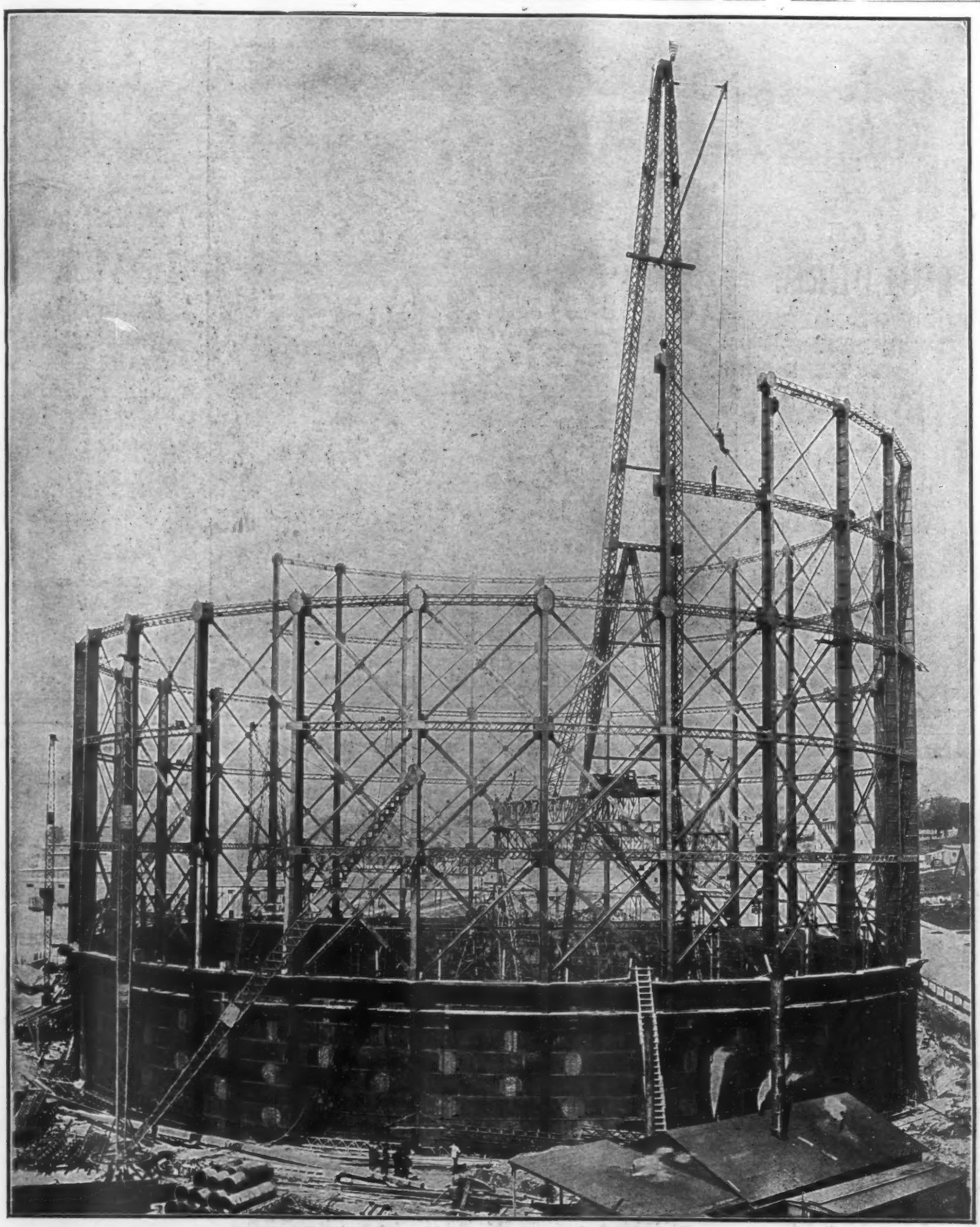

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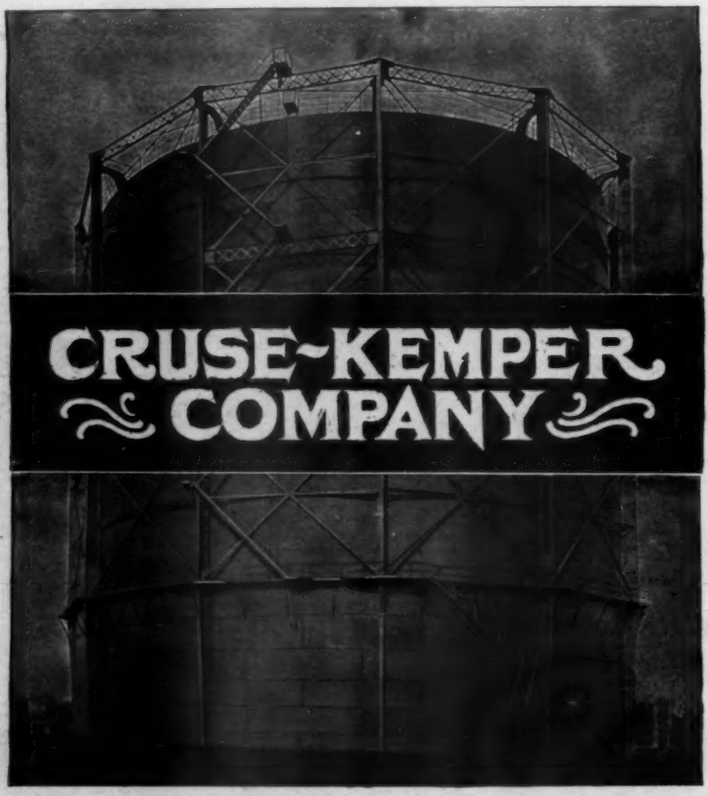

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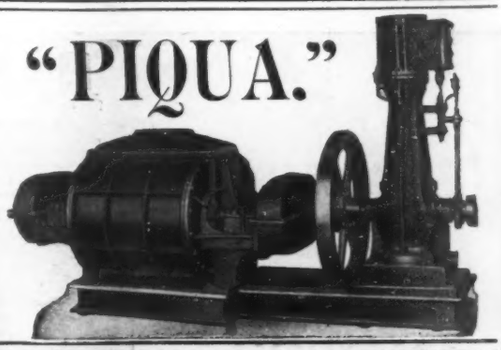

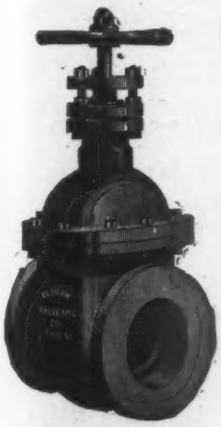

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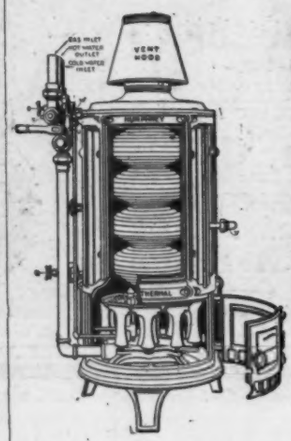

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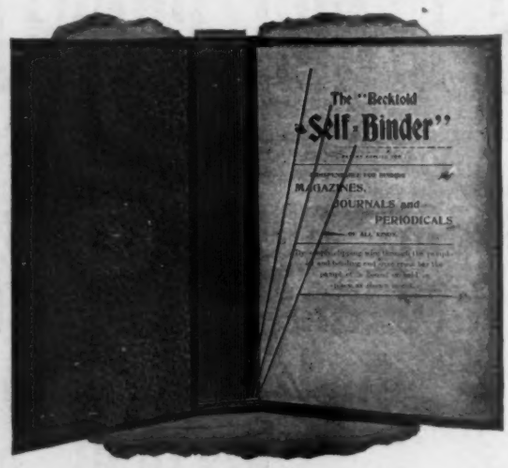

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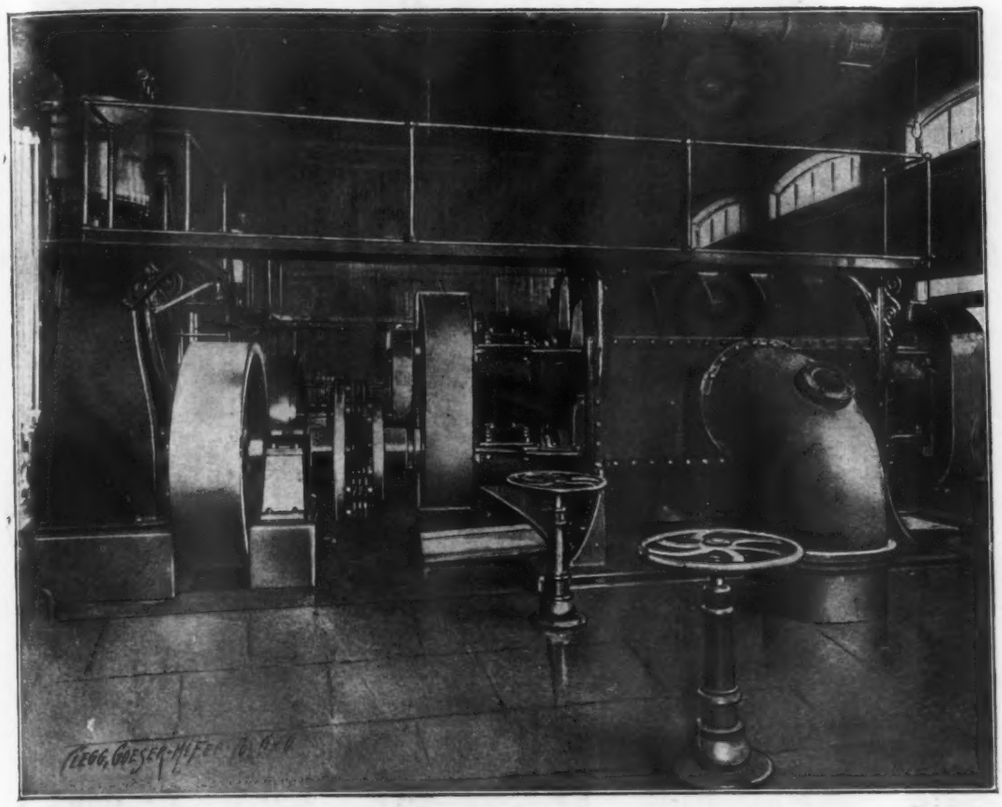

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PUBLIC LIGHTING TABLE.

JULY, 1909.

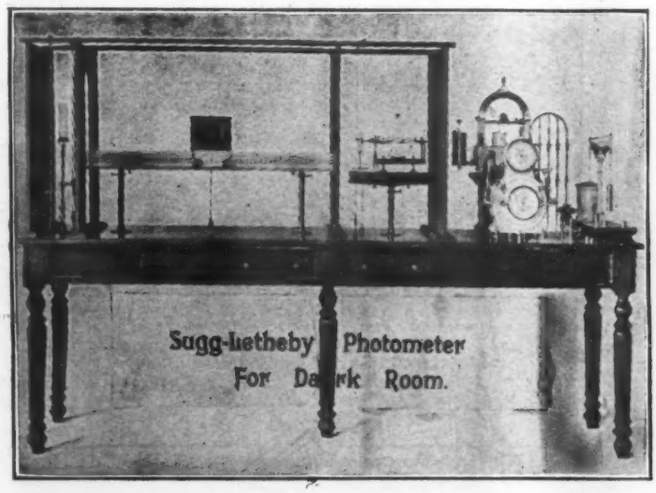
Table No. 1.
FOLLOWING THE MOON.

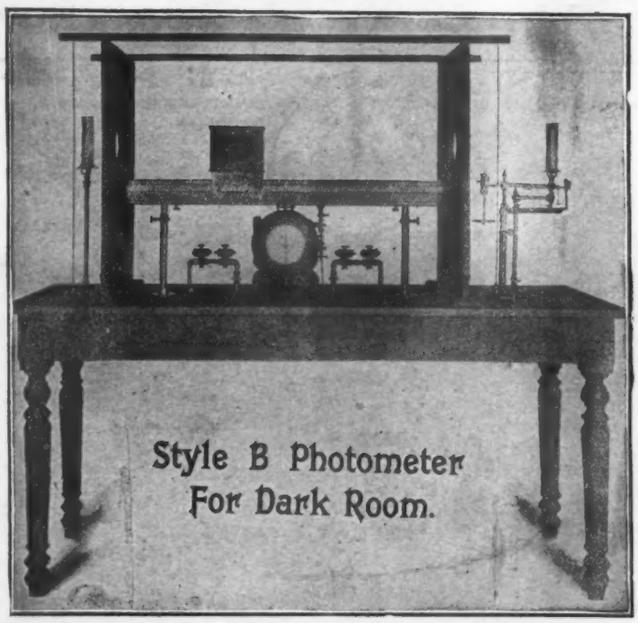
Day of Week.	Date.	Light.	Extinguish.
Thu.	1	2.30AM	3.30AM
Fri.	2	No L.	No L.
Sat.	3	No L FM	No L.
Sun.	4	No L.	No L.
Mon.	5	8.00PM	10.40PM
Tue.	6	8.00	11.20
Wed.	7	8.00	11.50
Thu.	8	8.00	12.20AM
Fri.	9	8.00LQ	12.50
Sat.	10	8.00	1.20
Sun.	11	8.00	1.50
Mon.	12	8.00	2.20
Tue.	13	8.00	3.40
Wed.	14	8.00	3.40
Thu.	15	8.00	3.40
Fri.	16	8.00NM	3.40
Sat.	17	8.00	3.40
Sun.	18	8.00	3.50
Mon.	19	8 00	3.50
Tue.	20	8.00	3.50
Wed.	21	9.10	3.50
Thu.	22	9.30	3.50
Fri.	23	9.50	3.50
Sat.	24	10.20	3.50
Sun.	25	10.40FQ	3.50
Mon.	26	11.10	3.50
Tue.	27	11.40	3.50
Wed.	28	12.20AM	3.50
Thu.	29	1.10	3.50
Fri.	30	2.10	3.50
Sat.	31	No L.	No L.

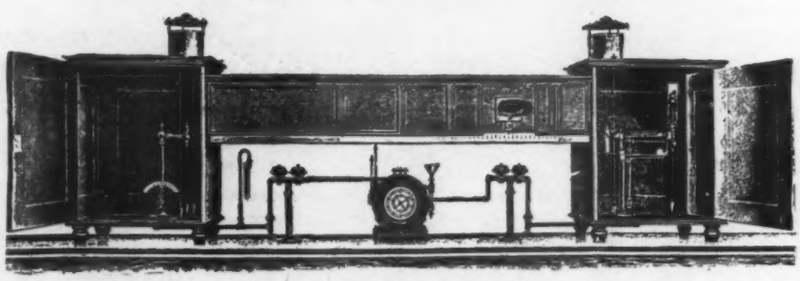
TOTAL HOURS DURING 1909.

By Table No. 1.

	Hrs.Min.
January	212.20
February	183.40
March	173.00
April	151.10
May	144.10
June	138.50
July	145.40
August	160.30
September	180.00
October	201.00
November	216.30
December	233.40
Total, yr.	2140.30







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CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

JULY, 1909.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A. M.
Thu.	1	7.27	3.07
Fri.	2	7.22	3.07
Sat.	3	7.22	3.07
Sun.	4	7.22	3.07
Mon.	5	7.22	3.07
Tue.	6	7.22	3.07
Wed.	7	7.22	3.07
Thu.	8	7.22	3.07
Fri.	9	7.17	3.12
Sat.	10	7.17	3.12
Sun.	11	7.17	3.12
Mon.	12	7.17	3.12
Tue.	13	7.17	3.12
Wed.	14	7.17	3.12
Thu.	15	7.17	3.12
Fri.	16	7.12	3.17
Sat.	17	7.12	3.17
Sun.	18	7.12	3.17
Mon.	19	7.12	3.17
Tue.	20	7.12	3.17
Wed.	21	7.12	3.17
Thu.	22	7.12	3.17
Fri.	23	7.07	3.22
Sat.	24	7.07	3.22
Sun.	25	7.07	3.22
Mon.	26	7.07	3.22
Tue.	27	7.07	3.22
Wed.	28	7.07	3.22
Thu.	29	7.07	3.22
Fri.	30	7.02	3.27
Sat.	31	7.02	3.27

TOTAL HOURS DURING 1909.

	Hrs.Min.
January	428.30
February	358.15
March	353.10
April	298.10
May	263.20
June	234.45
July	248.30
August	278.00
September	311.25
October	370.05
November	397.40
December	438.35
	3980.25
Deduct on account of 50 min. extinguishing time	30.25
Total, yr.	3950.00

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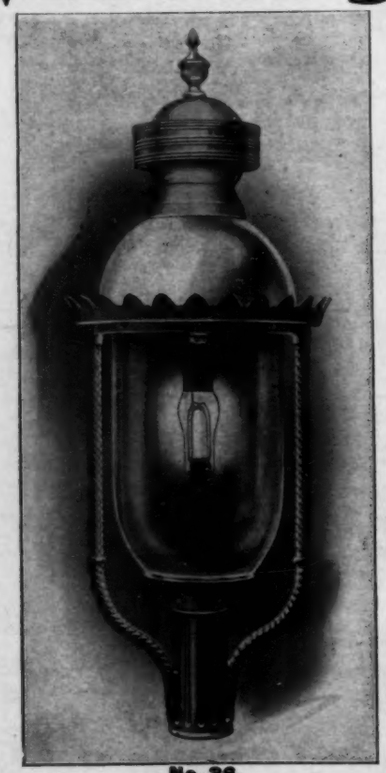

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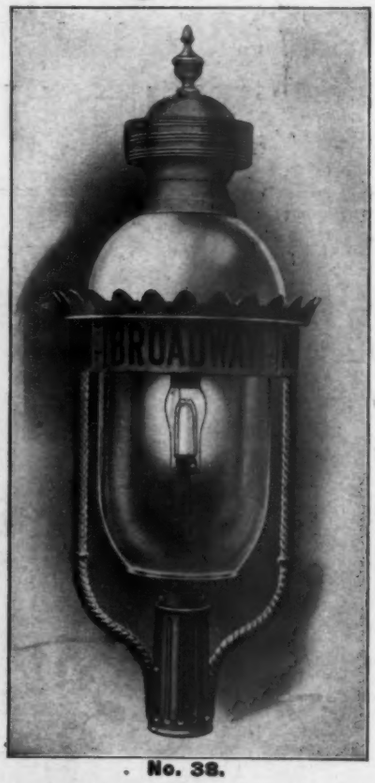

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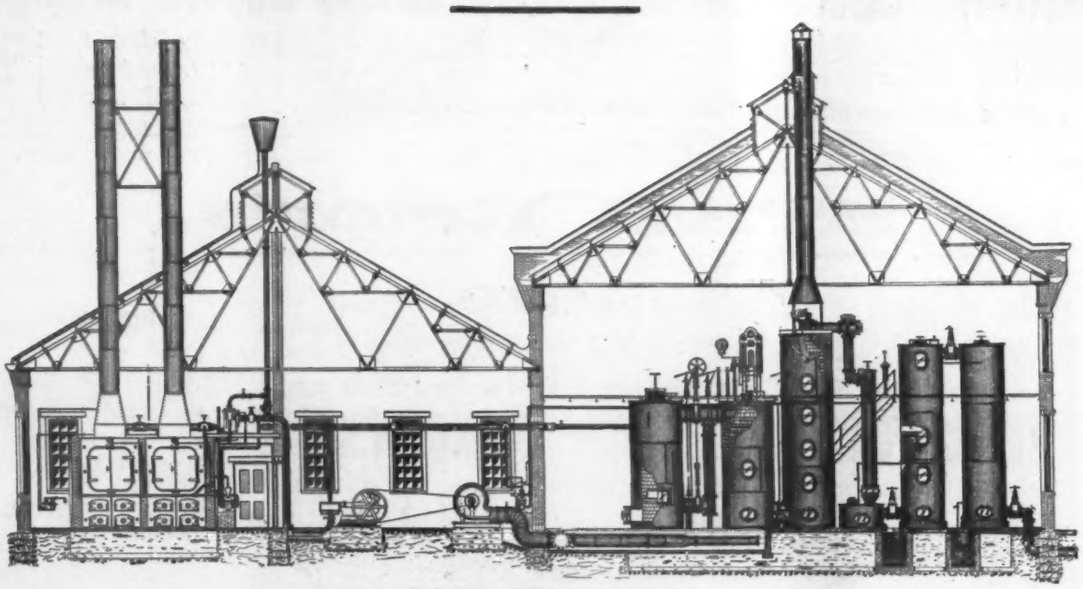

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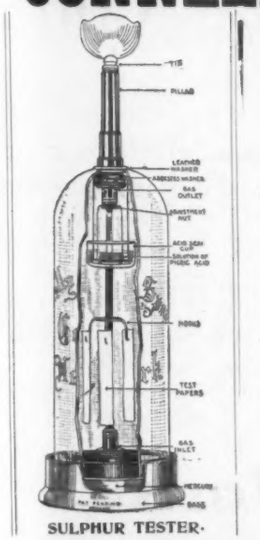

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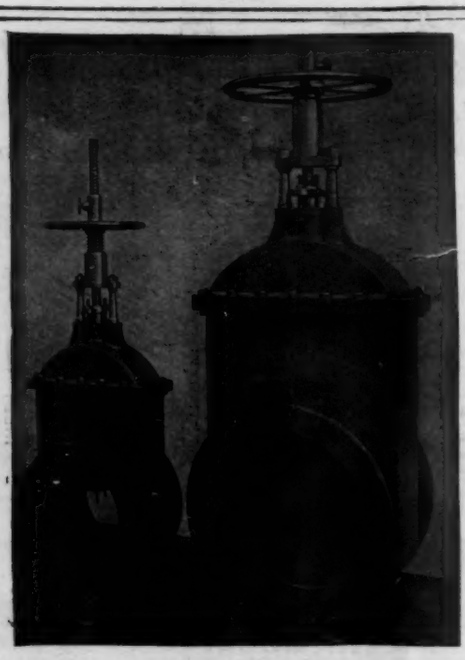

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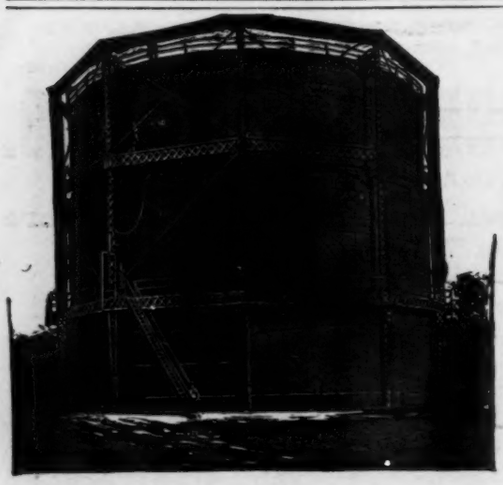

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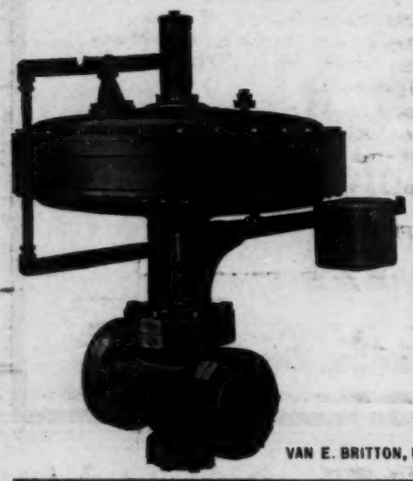

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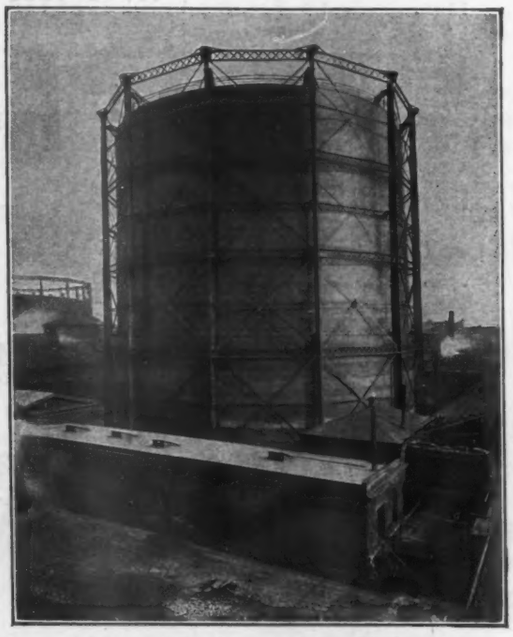

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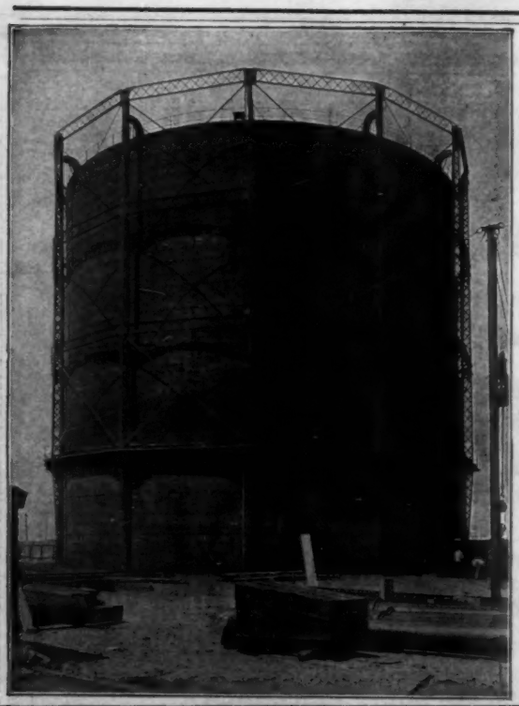

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